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ELECTRICAL REVIEW

Vol. CXLVI No. 3775 31ST MARCH, 1950

THE OLDEST ELECTRICAL PAPER • ESTABLISHED 1872

Main-Line Electrification

TECHNICAL ADVANCES REINFORCE CASE FOR CONVERSION

THE railways of Great Britain provide a classic example of the good being the enemy of the best. The very excellence of their steam locomotives has been an obstacle to their following the path of progress taken by other industries. They constitute the surviving example of reliance for motive power on simple non-condensing engines in isolated units as contrasted with the modern practice, evolved over more than a half-century, of using electric motors supplied with energy from central stations. Because of the low thermal efficiency of these engines some 10 million tons of coal could be saved each year by complete electrification and, what is equally to the point, this coal is of the large size and high quality which is in demand for other purposes, including export.

Taking Stock

Some compensation for the loss of nineteen years since the Weir Committee recommended that the main lines should be electrified is to be found in the activity in certain areas in this country and the achievements of British traction engineering overseas. During this period, moreover, there have been a number of important developments which have strengthened the case for main-line electrification.

Last week's Convention on Electric Railway Traction arranged by the Institution of Electrical Engineers provided a good opportunity for taking stock of the position to-day. Since 1931 the grid has been constructed, increasing the availability of supply, and the power conferred on the Central Electricity Board to deal directly with railway authorities (a power which was subsequently transferred to the B.E.A.) has greatly facilitated comprehensive negotiations. The situation in this respect should be further improved through the railways now being a single organization. Technical advances made during the period are exemplified in the mercury-arc rectifier and supervisory control of substations, ventilated motors with high power-weight ratio and diesel-electric locomotives, especially for shunting.

British Work Abroad

A good perspective of the position in this country was provided by Mr. C. M. Cock's integrating paper and his references to progress in design of the more important items of equipment were supported in convincing detail by the authors of others of the thirty papers presented. The term "integrating paper" might also be applied to Mr. E. T. Hippisley's review of schemes abroad which have been undertaken by British manufacturers in widely varying circumstances. While the most striking examples are of straight electrification at 1,500 or 3,000 V d.c., the value of the diesel-electric system has been proved

where water is scarce, oil cheap, or the traffic density too low to yield a satisfactory return on overhead equipment and substations. With the information now available, the time seems ripe for reconsideration of the Weir Report with a view to devising a realistic programme of electrification to be carried out during the next twenty years, taking into account national finances and present-day cost of equipment. Such a programme could set out a system of priorities, an illustration of which was given by Sir Cyril Hurcomb at the opening session of the Convention when he referred to the desirability of converting the London-Tilbury-Southend line and the remainder of the Southern Region system, including freight traffic, to electric working. Any plans for the future should, however, have due regard for the needs of overseas electrification projects.

PURCHASE TAX

Now that the date of the presentation of the 1950-51 Budget is known (18th April) efforts to persuade the Chancellor of the Exchequer of the need for a lightening of the purchase tax burden will be intensified. Time is short and the main provisions of the Budget have been settled no doubt. It is to be hoped that the Chancellor has been impressed by the arguments for the reduction of the tax on domestic electrical appliances (particularly water heaters), but it is as well to keep the case before him right up to the last possible moment. The case is that these appliances are essentials, not luxuries; that they do not necessarily add to the peak; and on the whole they are fuel economizers, not wasters.

GRID TARIFF

One year ago precisely a step was taken towards the standardization of the price to be paid by the fourteen Area Boards to the Central Authority for the energy they purchase in bulk from the Generating Divisions. As from 1st April, 1949, the plus and minus adjustments which had operated during 1948-49 were halved. They have now ceased altogether. With the introduction of the new uniform tariff as from to-morrow (1st April) more will have to be paid for bulk purchases in accordance with the modified rates announced elsewhere in this issue. The immediate change has been the addition of five shillings to the fixed portion of the charge, raising it to £3 15s per kW of maximum demand. The running charge remains unaltered, subject to the appropriate standard coal clause variation. The increased charge, which will fall more heavily on some Area Boards than others, is expected to enlarge the Central Authority's revenue from sales of energy by some 2 per cent

ENGINEERING EDUCATION

The disapproval of monotechnic colleges for university undergraduates in engineering, which was expressed by Professor E. B. Moullin in his presidential address to the Institution of Electrical Engineers last October, has been followed by protracted correspondence and by editorial comment in *The Times*. Last week Professor G. H. Rawcliffe (Bristol) suggested that very expensive equipment might justifiably be installed in an experimental engineering college with post-graduate studies mainly in view. He supports the view of the President that it is the "university atmosphere" which promotes the breadth of outlook requisite in men who aspire to be leaders of the professions that become increasingly prominent in the world at large. These require education for the future, as Professor Moullin has pointed out, as well as instruction for to-morrow.

CABLE ORDER MYSTERY

Some mystery surrounds a statement in the annual report of Aberdare Cables, Ltd., that in common with similar manufacturers "the bulk of the company's orders had been suspended by the British Electricity Authority." The B.E.A. has naturally pointed out that it does not place a great proportion of cable orders, that being the business of the Electricity Boards. The Boards do not seem to know of any suspension of orders nor do other cable makers. It has been suggested that the cuts in capital expenditure will eventually have some effect upon cable purchases, as upon orders for other electrical equipment, but it is not believed that the effect has yet been felt.

Steam Boiler Drums

Fabricated by Welding and Checked by X-rays

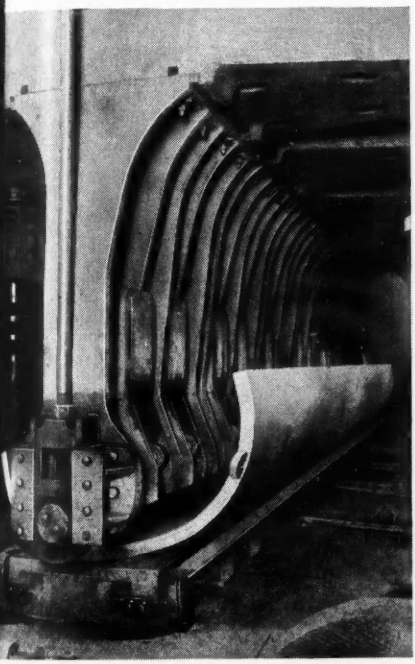
SINCE what is termed "fusion" welding replaced seamless forging, which had superseded the earlier riveted butt strap jointing, at the Renfrew works of Babcock & Wilcox, Ltd., some 2,380 welded pressure vessels have been manufactured there to Lloyd's Class I requirements.

Of this 17-year total, 1,530 welded drums have been for water tube boilers. The total includes 350 drums made for the Royal Navy during the war and a yearly average of 50 drums for naval and merchant marine service since the war ended. The remaining 850 pressure vessels went to the chemical and oil industries.

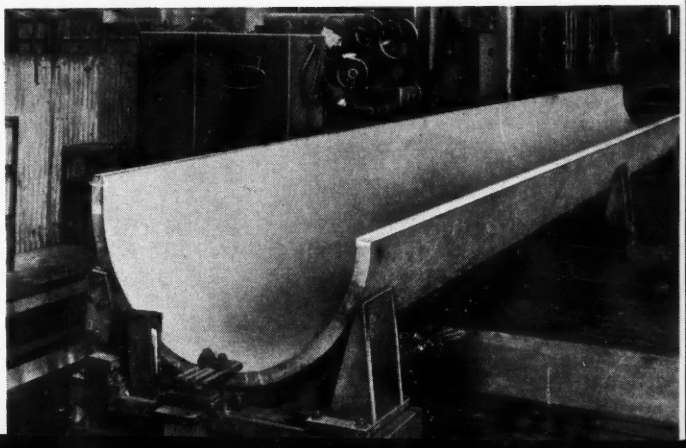
The dimensions of these cylindrical "drums" have grown to the maxima indicated in the table below. They are formed by bending steel plates, from each of which a piece is parted off to provide test pieces for confirming the soundness of subsequent welding.

	Boiler Drums	Special Vessels
Length	46ft 0in	92ft 2in
Diameter ...	5ft 6in	20ft 0in
Thickness ...	4⅞in	3⅜in
Weight	41½ tons	84 tons
Pressure	1,124 lb/sq. in.	1,320 lb/sq. in.

For bending plate up to 6in thick an 8,000-ton horizontal press was designed and built at Renfrew in 1928; there is a smaller vertical press that can also roll a plate into a complete cylinder with a single longitudinal joint. It is quicker to hot bend all plates over 2.5in thick; previously thick plate had to be stress-relieved, sometimes more than once, dur-



A thick drum plate being bent hot by 8,000-ton press



Bent plate being edge-planed in machine preparatory to welding

ing the operation. Near the presses is the heating furnace, 6ft high, 15ft wide and 45ft long, beside a shot-blasting booth for removing scale formed by oxidation while the plates are hot.

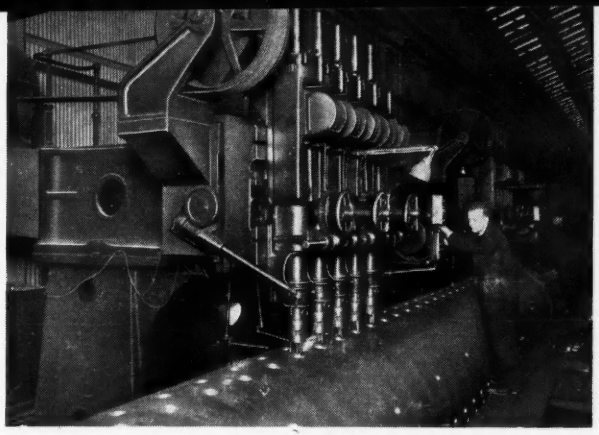
The bent half shells are edge planed so that when butted together a U-groove is formed to receive the weld metal. Where thick and thin plates are to be joined together, the former is tapered down at the edge to the same thickness as that of the thin plate. The half shells are assembled and tack welded together with the groove closed at the bottom by a backing strip which is tack welded in position inside the drum shell. The previously mentioned test plates, also machined to form a U-groove, are attached to one end of the shell at this stage so that weld metal may be deposited consecutively in the longitudinal seam and in the groove of the test plates as a continuous operation.

The assembled shell is placed on roller supports in a pit under one of the welding machines, each supported on a gantry to enable the length of the seam to be traversed while the drum remains stationary. Multi-layers are deposited one upon the other, staggered in the groove to allow overlapping. Each layer has the effect of refining the grain structure of the one beneath; when the groove has been filled, additional layers deposited in the same way above the plate level are chipped off, thus enabling the metal at the weld surface to be given a degree of grain refinement.

The welding machines have automatic arc control and electrode feed, but the electrodes are centred by the operator; the a.c. supply can be varied between 350 and 700 A, according to the electrode used, with an arc drop of about 35 V. The electrodes are made in the works, coated to suit the particular metal to be welded. After the backing strip is removed from the inside of the shell, the deposited metal at the bottom of the groove is cut out by a pneumatic chipping tool and a few layers of weld metal are deposited by hand in the small interior groove, which guards against lack of penetration at the root of the groove.

For the alternative submerged arc process a shallower V-shaped groove is used on both the inside and the outside of the shell, no backing strip being employed. A copper-plated steel electrode is used and the arc is entirely submerged under a separate loose flux powder which is continually fed into and over the groove by the welding machine. Some of the flux powder combines with the molten metal and some fuses and forms a refining slag which solidifies on top of the weld deposit; the remainder of the

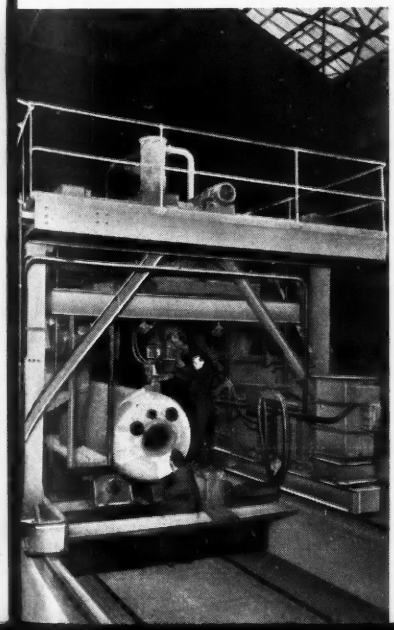
Multi-layer welding of longitudinal seam: note clamped-on test piece in left foreground



Drilling holes, which are machined prior to stress-relieving, before tubes and nozzles are welded into place

powder covers the weld and slag, shielding them from atmospheric contamination and retarding the rate of cooling. The unfused flux powder can be removed from the weld and re-used. For this method 35-40 V is employed with 900-1,500 A, dependent on the penetration required. At this high amperage deposition is heavy and obviates the necessity for repeated passages. It is important that the drum and the welding heads be set up very accurately to ensure penetration at the junction of the two heavy layers of deposition. The inner seam is deposited first. The head is carried on the end of a boom attached to a bogie, not self-driven, but drawn along by the travelling bridge which carries the external welding head. The bridge is motor driven. The exterior head can be raised or lowered to suit any diameter of drum by a motor under the control of the operator.

Submerged arc welding in progress on the circumferential seam of boiler drum

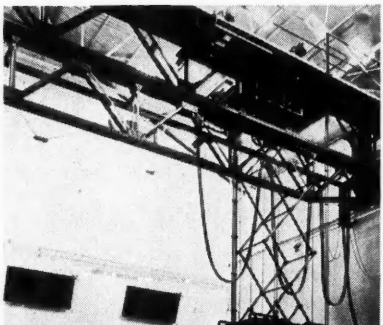


The positional adjustment of the interior head is small and is carried out by hand. The weld is made in the downhand position with current taken from two transformers incorporated in the bridge structure. Both heads are controlled from the same panel near the exterior head and in both cases the flux powder is fed to the welds from hoppers and is removed and recirculated by a fan system.

After the longitudinal seam is welded, the test plates are cut off and put on one side. The seam is dressed flush with the surface of the shell inside and outside and the ends of the shell are machined for the drumheads, which are hot pressed in the forge, pickled in acid to remove scale and machined to form the other half of the circumferential groove. They are tack welded to the shell and the circumferential seam is then welded by the same equipment. The heads, however, are now stationary and the drum is slowly revolved by the supporting rollers, which are motor driven through gearing at a speed consistent with the rate of deposition. The inside of the circumferential seam is completed in the same way.

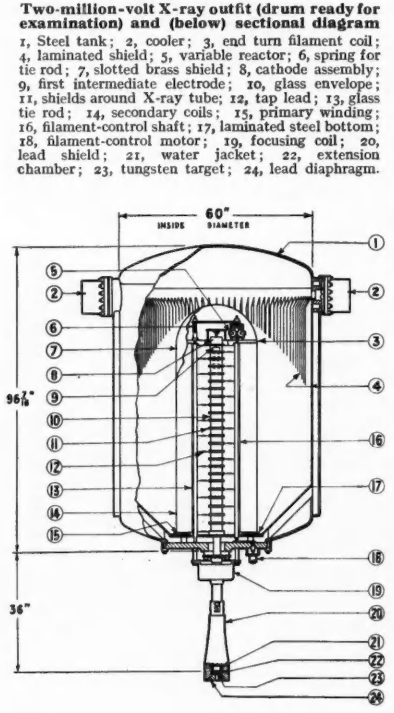
The dressed seams of the completed drum are divided into 12in lengths and marked to ensure that no part of the weld is missed during radiographic examination. Voids having a dimension in the direction of the rays of less than 2 per cent of the plate thickness are clearly shown. If defects are revealed, the affected areas are cut out with pneumatic chipping hammers and filled up by hand welding.

The drum is then marked off for holes



Two-million-volt X-ray outfit (drum ready for examination) and (below) sectional diagram

1, Steel tank; 2, cooler; 3, end turn filament coil; 4, laminated shield; 5, variable reactor; 6, spring for tie rod; 7, slotted brass shield; 8, cathode assembly; 9, first intermediate electrode; 10, glass envelope; 11, shields around X-ray tube; 12, tap lead; 13, glass tie rod; 14, secondary coils; 15, primary winding; 16, filament-control shaft; 17, laminated steel bottom; 18, filament-control motor; 19, focusing coil; 20, lead shield; 21, water jacket; 22, extension chamber; 23, tungsten target; 24, lead diaphragm.



to be cut by gas torches to enable branches and nozzles to be welded in position. The welding groove in this case is a half U formed by pneumatic chipping hammers. The nozzles are hand welded, the joint being preheated if necessary. The drum is finally stress-relieved by being heated to 650 deg C in a furnace and allowed to cool in a draught-free atmosphere. The test plates are inserted into the drum before stress-relieving to ensure that their final condition is truly representative of the welded seams.

They then go to the Research Department where compliance with the specified code of construction is confirmed before the drum is hydraulically tested to twice its designed working pressure.

Because of the heat absorbed by the brick walls of the original furnace, stress-relieving cycles sometimes took 36 hours to complete. In 1942 a new furnace 16ft wide, 17ft 6in high and 50ft long was built of refractory insulating brick with walls of light panel construction only 1ft 3in thick; this reduced the cycle time to one-third of the original.

The first X-ray equipment installed at Renfrew in 1932 was rated at 200 kV for plates up to 2in thick. Several 400 kV sets installed since 1934 will deal with up to 4in thickness while the outfit provided in 1949 is capable of X-raying upward of 6in thickness. When operated continuously at 1.5 mA and 2,000 kV (peak) it produces as much radiation as 20 lb of radium.

The tank head is held in a fork arranged to swivel in the supporting frame of a pantograph mounting. The whole is suspended by wire ropes from a winch in the crab of a B. & W. overhead travelling crane. All motions and angular adjustment are controlled from a multi push-button box pendant at ground level.

The sealed X-ray tube, operating in a self-rectified circuit, is directly connected to the h.v. winding of a step-up transformer, one end of which is earthed. This, together with an appropriate change in the design of the tube itself, enables the source of radiation to be brought outside the tank so that the active end may be placed inside a vessel to be examined and an entire welded seam irradiated at one time.

The transformer operates with a tuned secondary circuit adjusted to resonance at

180 c/s. Its l.v. winding consists of two flat coils, with the h.v. coil, which consists of 243 flat sections, stacked on top of the primary, and suitably spaced to facilitate cooling. The resonance principle makes an iron core unnecessary, so the central space of the h.v. coil houses the X-ray tube. This arrangement materially facilitates the connection of the various tube electrodes to the h.v. winding and provides an electrostatic shield for the tube.

To avoid overheating of the surrounding steel tank by eddy currents, an inner lining of narrow overlapping silicon steel strips is spot welded to the tank wall. This shell guides the magnetic flux from the top to the bottom of the coil stack, the lower end being provided with a ring of radially spot welded strips of similar material.

The tube envelope consists of twenty-four sections of moulded boro-silicate glass tubing joined to "Fernico" rings which carry the internal electrodes of stainless steel. The insulating envelope is 60in long and of 3.5in diameter and to increase the voltage gradient which may be applied to any section of the tube the inside of the glass walls is sandblasted. A tungsten target backed with copper is mounted in the lower end of the extension chamber and both target and chamber walls are water-cooled. The tube is supported by a metal flange bolted to the bottom of the tank. The use of gas as an insulator in the transformer has reduced its bulk and weight. The gas is sulphur hexafluoride (SF_6) at 60 lb/sq in.

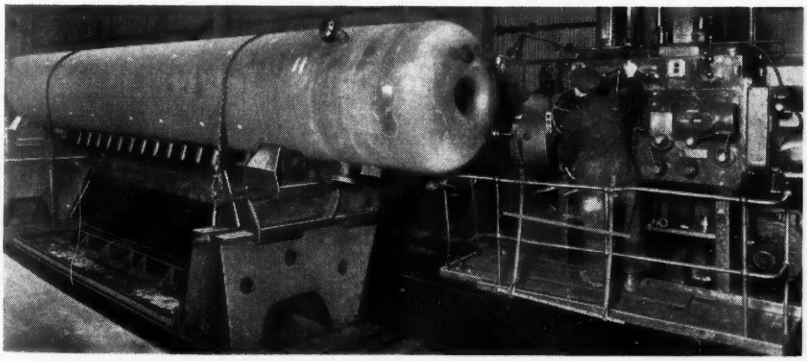
Power for the X-ray equipment is furnished by a motor-generator set. It consists of a 25 h.p. auto-synchronous motor, fitted with a slip cycle impedance relay starter, coupled by an inverted tooth chain to a 10 kVA 500 V 180 c/s single-phase alternator for the transformer and a 4.5 kVA 220 V 60 c/s three-phase alternator for subsidiary control circuits.

The X-ray unit (Newton Victor, Ltd.) is in a concrete enclosure 59ft wide, 70ft long and 40ft high; the walls are of sufficient thickness to form primary barriers against radiation.

A small access opening is connected by a tunnel or "maze" with lead-lined door to a control room. The large opening through which work is conveyed into the enclosure is protected on the inside with a lead-lined steel screen and a 50 ton concrete door on the outside.

For the purpose of conveying the heavy drums from the main shop to the X-ray enclosure, a power-operated carriage has been designed incorporating turning gear. It is electrically driven and push-button controlled, with ultimate limit switches and fully interlocked, for traversing and rotating to align a horizontal drum seam with the tube head and for positioning a section of a circumferential seam for X-raying. Inside the control room are two panels, one for X-raying and the other to safeguard personnel, which is also the distribution point for all electrical equipment associated with the X-ray unit.

Nozzle facing, note row of stub tubes visible on the underside of the drum



VIEWS on the NEWS

By REFLECTOR

SOME employers are not in favour of the breaks in working hours which are now customary in most industries. Yet they may sometimes be usefully employed, as in a recent case reported in the journal of the Electrical Trades Unions. There was a question regarding the implementation of the 1½d an hour increase to members of the Union in a certain undertaking. The area official reports that this "was satisfactorily resolved during a tea-break conversation with the Sub-Area manager."

★ ★ ★

I thought that by this time the confusion arising from the duplicate (or is it triplicate?) use of the initials "B.E.A." had been got over. But it is not so for in the House of Commons last week Mr. J. Grimston asked the Minister of Fuel and Power what was the average weight of coal needed to produce one kilovolt-ampere by the British European Airways Corporation. This vision of flying power stations (after all there are "Flying Fortresses") was dispelled by Mr. Noel-Baker who replied that during 1948-49 the power stations of the British Electricity Authority, "to which I must presume the hon. member refers," consumed on the average 1.478 lb of coal per kWh sent out.

★ ★ ★

Some of the tasks which now come within the province of "electricity supply" would astonish the pioneer engineers of the past. I have just been looking through the annual report of the Hydro-Electric Power Commission of Ontario—a most interesting document of over 400 pages—and find that the wide variety of researches carried out include such things as measures to control house flies, mosquitoes and black fly, particularly in construction camps. The Commission has a forestry section responsible for 12,000 acres of land. Besides managing the forest land it carries out a large programme of protective tree planting, mostly by mechanical means. Control of weeds, brushwood, etc., has been the subject of considerable experimenting in the course of which some 36,000 gallons of different chemicals have been applied by spraying.

★ ★ ★

I recently referred to houses which had been wired many years before electricity actually became available. Apparently this well-advanced preparation is still proceeding. It was complained, at a meeting at Stoke-on-Trent, that the Midlands Electricity Board had undertaken an installation contract in Shropshire, although it had admitted that there would be "some delay" in providing a supply. Alderman H. Leason, chairman of the Midlands Electricity Consultative Council, is reported by the *Birmingham Post* to have said: "It does seem queer that the Board should be wiring houses when an electricity supply is not available. The Board will give a supply but the question is 'When?'"

★ ★ ★

This seems to have been bettered in Mexico, where, according to *The Times*, a salesman has managed to sell electric lamps to people without electricity and, presumably, without electrical installations. Having done this he, or his associates, proceeded to sell "current" to the purchasers pointing out, no doubt, that the lamps were precious little good without electricity.

★ ★ ★

When the Colne Engaine (Suffolk) Parish Council recently considered a recommendation that an electric lamp should be erected near the "Lovers' Stile" it was argued that it would interfere with village amenities. It is evident that amenities (with which electricity seems to be so often in conflict) are not always scenic or cultural.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE B.B.C. has announced the appointment of **Mr. H. W. Baker,** who has been engineer-in-charge of the London television station at Alexandra Palace since 1946, as assistant superintendent engineer, television. Mr. Baker left the Marconi Co. in 1926 to join the B.B.C. and was appointed assistant engineer-in-charge at Alexandra Palace in 1937 soon after the station opened. During the war he was successively engineer-in-charge of the Lisnagarvey transmitting station in Northern Ireland and of the high-power long- and medium-wavelength station at Ottringham, near Hull, which broadcasts B.B.C. programmes to Europe.

Mr. J. Innes, managing director of Cable & Wireless, Ltd., is retiring on 31st March, and he is being succeeded by **Major-General A. B. Nicholls,** who has been a director of the company since January, 1947.

In our last issue we briefly announced the appointments of **Messrs. C. H. Crowlie** and **H. G. Meads** to the board of Hoover (Electric Motors), Ltd., and **Messrs. A. G. Colston, S. Roberts** and **A. R. Northover** as directors of Hoover (Washing Machines), Ltd.

Mr. Crowlie joined Hoover, Ltd., in 1920, and subsequently became divisional manager for the South of England. During the last war he was employed on public relations work in the Royal Ordnance Factories of South Wales. In 1946 he was appointed sales manager in charge of Hoover marketing in Great Britain and Ireland, and later assumed responsibility also for the marketing of Hoover fractional horse-power motors.

Mr. Meads joined Hoover, Ltd., in 1933 as assistant accountant, becoming chief accountant in 1936, assistant secretary in 1936, and company secretary in 1946. On their formation in the following year he was appointed secretary also of the two subsidiary companies.

Mr. A. G. Colston, brother of Mr. C. Colston, joined Hoover, Ltd., in 1923 as salesman and soon afterwards was appointed district manager. He became assistant service manager in 1927 and was appointed to full control in 1930.

Mr. Roberts joined Hoover, Ltd., in 1929 as a salesman, becoming branch manager in 1937. In the last war he served with the Royal Lincolnshire Regiment, gaining a commission, and saw service in India and Burma. Returning to Hoover in 1945 he organized and extended the system of training newcomers to the sales organization; he was promoted sales personnel manager in 1946, and in the following year field sales manager for Great Britain and Ireland.

Mr. Northover joined Hoover, Ltd., as chief inspector soon after manufacture first began at Perivale, Middlesex, in 1932, becoming superintendent in charge of motor production in 1935. During the remaining war years he controlled work at a nearby factory. In 1946 he organized production at the new Hoover factory then in construction at Merthyr Tydfil for the production of electric washing machines, and, later that year, was appointed works manager.

Mr. A. L. Fielding, M.Inst.C.E., M.I.E.E., A.M.I.Mech.E., advisory and inspecting engineer for the New South Wales Government, has also recently been appointed official representative in London

New directors of Hoover subsidiaries. Left to right: Messrs. A. R. Northover, A. G. Colston and S. Roberts, who have joined the board of Hoover (Washing Machines), Ltd., and Messrs. C. H. Crowlie and H. G. Meads, appointed directors of Hoover (Electric Motors), Ltd.

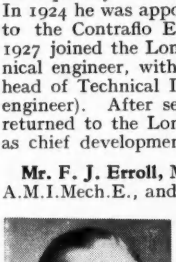
for the Snowy Mountains Hydro-Electric Authority of the Australian Commonwealth Government.

The British Electricity Authority has appointed **Mr. C. E. H. Verity,** O.B.E., M.I.C.E., M.I.E.E., M. I. Mech. E., as deputy chief engineer (generating station) construction.

Mr. C. E. H. Verity

Before vesting day Mr. Verity was chief development and testing engineer (mechanical engineering) of the London Power Co., and since the B.E.A. took over he has been largely concerned with the Authority's programme of construction of power stations throughout the country. Mr. Verity was educated at Wellingborough School and Bedford Technical College, and received his technical training with W. H. Allen Sons & Co., Ltd., with whom he subsequently became contracts engineer. In 1924 he was appointed technical engineer to the Contraflo Engineering Co., and in 1927 joined the London Power Co. as technical engineer, with whom he later became head of Technical Department (mechanical engineer). After service in the R.A.F. he returned to the London Power Co. in 1945 as chief development and testing engineer.

Mr. F. J. Erroll, M.P., M.A., A.M.I.E.E., A.M.I.Mech.E., and **Mr. P. C. Barnett** have been elected directors of Enfield Cables, Ltd.

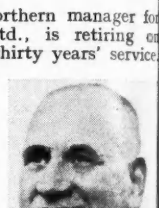


Mr. F. J. Erroll

Mr. Erroll was educated at Oundle School and Trinity College, Cambridge, and served an apprenticeship with the Metropolitan-Vickers Electrical Co., Ltd., with whom he was subsequently on the staff of the Research Department. In 1938-39 he was with Evershed & Vignoles, Ltd., and from 1939 to 1945 saw war service, first in the 4th County of London Yeomanry (T.A.), in which he held a commission, and later in the Tank Division of the Ministry of Supply, travelling on its behalf to Italy, India and Burma as technical adviser on armoured fighting vehicles. He was gazetted colonel in 1945, and was elected M.P. for Altrincham and Sale in the same year, being re-elected at the last general election. Mr. Erroll is also a director of W. J. Furse & Co. (London), Ltd., Mills Scaffold Co., Ltd., Ledloy, Ltd., and Richard Johnson & Nephew, Ltd. He read a paper, jointly with Lord Forrester (now Lord Verulam), managing director of Enfield Cables, during the last session of the I.E.E., on "High Voltage Direct Current Transmission."

Mr. Barnett is a partner in the well-known firm of stockbrokers, Cazenove, Akroyds & Greenwood & Co., who recently handled the issue of new capital for Enfield Cables, Ltd., He served in the Army during the last war and held the rank of captain.

Mr. J. E. Favell, northern manager for Revo Electric Co., Ltd., is retiring on 31st March after over thirty years' service. **Mr. J. S. Gow,** who has been with Mr. Favell for many years, will succeed him as branch manager of the company's Newcastle depot and he will be assisted by **Mr. T. C. Bell,** who has recently joined the company.



Mr. J. E. Favell

Mr W. L. White is resigning from Arrow Electric Switches, Ltd., with whom he has occupied the position of sales manager for the past six years. As from 1st April he will take up new duties as branch and area manager of the southern and south-western counties for Bill Switchgear, Ltd., of Birmingham. Before joining his present company he was for many years with Berry's Electric, Ltd.

Mr. B. C. Skinner has been appointed general sales manager of Arrow Electric Switches, Ltd. He joined the company sixteen years ago and was previously in the electrical and export trades both at home and abroad. Before serving with the Royal Tank Regiment in the last war he was export manager, and returned in 1946 to devote his efforts to export sales again. Mr. Skinner is now in charge of both domestic and export sales of the company.

Mr. R. M. Robson, B.Sc., who, as was briefly reported in our last issue, has been appointed chief engineer of the D.P. Batteries Co., Ltd., in succession to **Mr. H. G. Brown,** was educated at the Manchester Grammar School and graduated in general science at London University as an external student after attending part-time courses at the Royal Technical College, Salford, and

the College of Technology, Manchester. He joined the Chloride Electrical Storage Co., Ltd., in 1926, and, after a period of training in all departments, served on the technical staff until 1943 when he joined the D.P. Battery Co., Ltd., as assistant to Mr. Brown. The services of Mr. Brown will still be available to the D.P. Co. in an advisory capacity.

Mr. E. W. Tole, A.M.I.E.E., whose retirement from the South Western Electricity Board we recently reported, has now become a director of J. W. Woolley & Co. (Southern), Ltd., a company recently formed to handle the sale of Woolley dairy sterilizing equipment in the Southern Electricity Area.

Mr. W. H. McFadzean, deputy chairman of British Insulated Callender's Cables, Ltd., has also been appointed chief executive, and **Dr. L. G. Brazier** and **Mr. H. J. Stone** have been elected to the board as executive directors.

Mr. P. V. Hunter has been elected chairman of the Telegraph Condenser Co., Ltd., in place of **Mr. W. H. McFadzean,** who has resigned, and **Mr. T. H. Martin-Harvey** has been elected deputy chairman in place of Mr. Hunter.

Mr. Barrie Heath has been appointed to the board of Powell Duffryn Carbon Products, Ltd., as managing director. **Dr. D. B. Foster,** who has been associated with the development of the company's various grades of carbon for electrical, mechanical and chemical uses at the Powell Duffryn Research Laboratories, has also joined the board of the company.

The annual dinner of the **B.T.H. (Rugby) Apprentices' Association** was held at the Rugby Works on 10th March and was attended by a large gathering, including five directors and several departmental managers. Mr. F. Szekely (chairman of the Association) presided, and the chief guest was Mr. W. W. Vinsen (director of manufacture) and among the many others present were Mr. J. S. Ramsden (director, Crown House), Mr. L. J. Davies (director of research and education), Mr. H. L. Satchell (director and works manager) and Mr. E. S. Little (secretary and comptroller). The tennis singles cup and table tennis cup were presented by Mr. H. W. Malin (head of Apprentice and Training Department) to Messrs. C. W. Gunson and J. L. Ward respectively.

At a dinner held at the Savoy Hotel on 21st March, the chairman and directors of **British Insulated Callender's Cables, Ltd.,** entertained a large and distinguished company of electric traction engineers representing the profession both at home and overseas. The sixty guests were officially welcomed by Mr. W. H. McFadzean (deputy chairman). Mr. C. M. Cock, M.I.E.E. (British Railways Executive), responded on behalf of British guests, and Mr. T. H. Thelander (chief electrical engineer of the Swedish State Railways) thanked the hosts on behalf of the overseas visitors. The company then saw a film showing the electrification of the Liverpool Street-Shenfield section of British Railways.

Over 100 members and friends of the **Sloan Electrical Co.'s** Social Club, from the head office at Kingsway, and the depots at Ealing, Leyton, Peckham, Vauxhall and Watford, attended a dance at the "Paviour's Arms," Westminster, on 18th March. Music was provided by Frank Charles' Dance Orchestra, and there were a number of novelty features. Further items planned by the committee include a visit to the Royal Tournament, an outing by coach to Littlehampton, beetle and whist drives, a theatre visit in October, dances, and the annual Christmas children's party.

OBITUARY

Mr. A. L. Coward.—In our last issue we briefly announced the death of Mr. Arthur Langdale Coward, M.I.E.E., at Birmingham on 14th March. Mr. Coward was born in 1885 and educated at Blackburn Grammer School and the Municipal School of Technology in Manchester. Afterwards he was with Dick, Kerr & Co., Ltd., and later the English Electric Co., Ltd., where he became experienced in the installation and commissioning of all types of electrical plant in many parts of the country. In 1923 he joined the firm of Highfield & Roger Smith, consulting engineers, engaged in supervising power station extensions at Upper Boat, South Wales, and in 1930 he was appointed manager of the firm's Birmingham office and supervised the construction of overhead lines, substations and plant in the Central England area for the Central Electricity Board. In 1938 he became a partner and continued to control the firm's office in Birmingham.

The late Mr. A. L. Coward

Mr. H. G. Redfern, superintendent of the Chadderton and Greenhill generating stations, Oldham, died on 17th March following an operation. The funeral took

place on 22nd March at Oldham. The North Western Division of the B.E.A. and the North Western Electricity Board were represented by Mr. P. Ridings, generation engineer, No. 2 Sub-Division, and Mr. E. Binns, manager No. 3 Sub-Area. Mr. Redfern joined the Oldham undertaking in 1913 and was appointed station superintendent in 1942. He had previously been associated with the Blackpool and Birkenhead undertakings and the Yorkshire Electric Power Co.

Mr. F. A. Cobb, Labour M.P. for Brighouse and Spenborough, who died on Monday last, was a former chief engineer of the Indian Broadcasting Co., Calcutta, and later managing director of Electronic Tubes, Ltd.

Mr. D. Bonney.—The death is announced of Mr. Daniel Bonney, head of the External Relations Division of the English Electric and Marconi group of companies, and director of nine overseas associated companies, which occurred on 23rd March in Chelmsford Hospital. He had been a member of the staff of the Marconi Co. for twenty-four years. Mr. Bonney had travelled widely in carrying out the duties of the directorships he held on behalf of the English Electric and Marconi Companies in Belgium, Switzerland, Sweden, Spain, Italy, Poland, South Africa and Hong Kong, and had flown 3,000 miles within the last three months.

The late Mr. D. Bonney

WILLS

Mr. H. M. Sayers, M.I.E.E., M.Cons.E., technical press officer of the London Power Co. from 1928 until his retirement in 1939, who died on 21st Dec. last, left £912 gross (£875 net).

Mr. R. C. Graseby, M.I.E.E., F.B.H.I., former managing director of Venner Time Switches, Ltd., and managing director of Graseby Instruments, Ltd., who died intestate on 6th Dec. last, left £122,831 gross (£121,638 net).

Mr. W. McGeoch, deputy chairman of William McGeoch & Co., Ltd., who died on 21st Sept. last, left £53,085 gross (£52,977 net).

Mr. E. G. Anness, M.I.E.E., a director of Browning's Electric Co., formerly senior electrical engineer in the London district of the National Boiler and General Insurance Co., Ltd., who died on 21st September last, intestate, left £2,002 gross (£1,961 net).

Mr. G. W. Burt, for over twenty years chief electrical engineer to Gateshead Corporation, who died on 7th December last, left £1,650 gross (£1,594 net).

Mr. C. J. A. Galloway, a director and London works manager of Keith Blackman, Ltd., who died on 24th November last, left £14,060 gross (£13,934 net).

Domestic Hot Water

SPECIAL Report No. 8 in the National Building Studies series summarizes the results of an inquiry into domestic hot water supply in Great Britain. Part 1, now available from H.M. Stationery Office at 1s, covers the distribution of water-heating appliances and their use in winter. The survey is based on 5,997 sample households well distributed throughout Great Britain and the results are analysed according to different types of dwelling, income groups, etc.

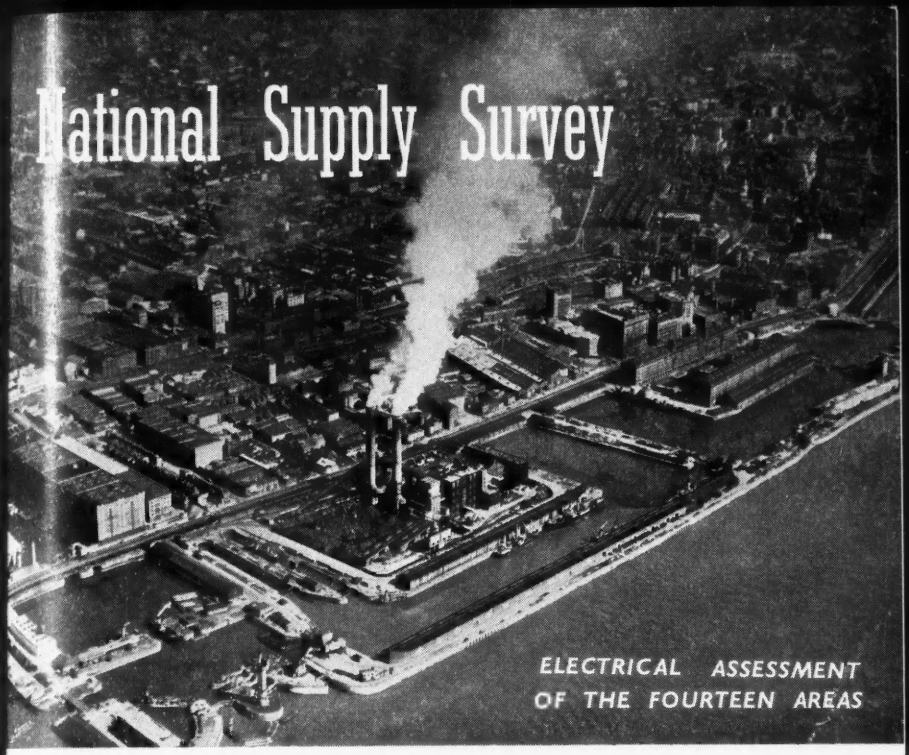
It was found that 68 per cent of the households had "access to" solid fuel water-heating appliances, including 4 per cent with auxiliary electric immersion heaters. Gas water heating was available in 44 per cent of the households (coppers 30 per cent) and electric heating in only 7 per cent (storage water heaters 3 per cent; coppers 4 per cent).

The most frequent complaint about gas and electric storage heaters was that they did not provide enough hot water at a time. Immersion heaters were considered the more satisfactory by 89 per cent of those using "piped appliances" and relatively high proportions of those with gas or electric coppers were satisfied. One in four housewives with gas geysers complained that the water had to be run off too slowly and the geysers were more often under repair than any other appliance.

Brush Ex-Apprentices

THE Brush Electrical Engineering Co., Loughborough, has decided to form an association of former Brush apprentices. A provisional committee has been formed with Mr. J. H. R. Nixon, technical director, as chairman. An annual general meeting will be held in London later in the year followed by a dinner. All former Brush apprentices are invited to write to Mr. K. H. Platt, chief education officer of the company, at Loughborough, giving their names, present firms, positions held, their present address and the dates when they were apprenticed.

National Supply Survey



ELECTRICAL ASSESSMENT OF THE FOURTEEN AREAS

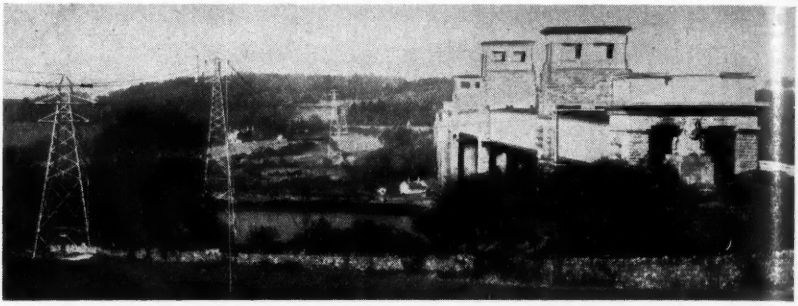
11—MERSEYSIDE AND NORTH WALES

IN dealing with the Merseyside and North Wales Electricity Area, which has a coverage of 4,675 square miles, our references to some of the special Ordnance Survey maps will all contribute to the electrical assessment we aim at. First, geographically: About half of the Area boundary, roughly north and west, constitutes that part of the west coastline of England and Wales stretching from a few miles below Aberystwyth in the south to just above Southport in the north.

From the southernmost point the inland boundary of the Area first takes a north-east-east course to about Bishops Castle, following the Montgomeryshire south boundary some of the way and the South Wales Electricity Area most of the way; then north-easterly to a point on the Cheshire-Staffordshire boundary near Congleton, where the boundaries of the Merseyside and North Wales, the North Western and the Midland Electricity Areas all meet; then the Area boundary runs north-west to its northernmost point.

We chose as the background of our specially prepared electrical assessment map a "Land Utilization" scheme based on the O.S. map of that name, combined with outlines of the coalfields, not so much because of the extremes in the Area, and they are striking enough, but mainly because of the quick-change nature of the land. For instance, the "Land Utilization" map shows in the west the great mountainous area as

Liverpool, the subject of the title picture, is the country's second largest port, and Clarence Dock is by far the largest power station in the Merseyside and North Wales Area *(Aero Pictorial photo)*



The Menai Strait, which is famous for its bridges and, more recently, for its transmission-line crossing

mainly heathland, moorland and rough pasture, but with a fair amount of meadowland and some forest up the valleys and around the coast, particularly in the north. In the east are the great dairying lands of Shropshire and Cheshire, styled meadowland, well patched with arable. Then there is the large splash of urban marking on both sides of the Mersey, representing Liverpool and Birkenhead; and around Liverpool, i.e., north, east and south, is a belt of arable land.

In addition, to complete our geographical definition, the "Coal and Iron" map shows the Lancashire coal field just dipping into the Area east of Liverpool; but within the Area in this field several sizeable collieries add to the industrial intensity of this dockland district. Another crescent-shaped coalfield stretches from about Prestatyn on the coast in the north to near Oswestry in the south, and it has a few large pits around about Wrexham.

Perusal of the "Population Density" map reveals only one large patch of dense urban (over 25,000 per square mile), i.e., on the Mersey and mainly Liverpool. The scheme here has the usual pattern of an urban belt (6,400 to 25,000 per square mile) round the dense urban, and suburban and industrialized rural (400 to 6,400) round the urban. There are a few small markings and dots for the two highest grades at places like Chester, Rhyl, Colwyn Bay, Llandudno, Holyhead, Aberystwyth, Oswestry and Wrexham, a large industrialized rural marking from the north coast roughly following the coal field south to Oswestry, and small patches of the same marking representing other and smaller coastal towns and inland places like Blaenau Ffestiniog, Llanrwst and Denbigh. For the rest we have large areas of dense rural and sparse rural mainly surrounding large pockets of "virtually uninhabited" representing the higher levels.

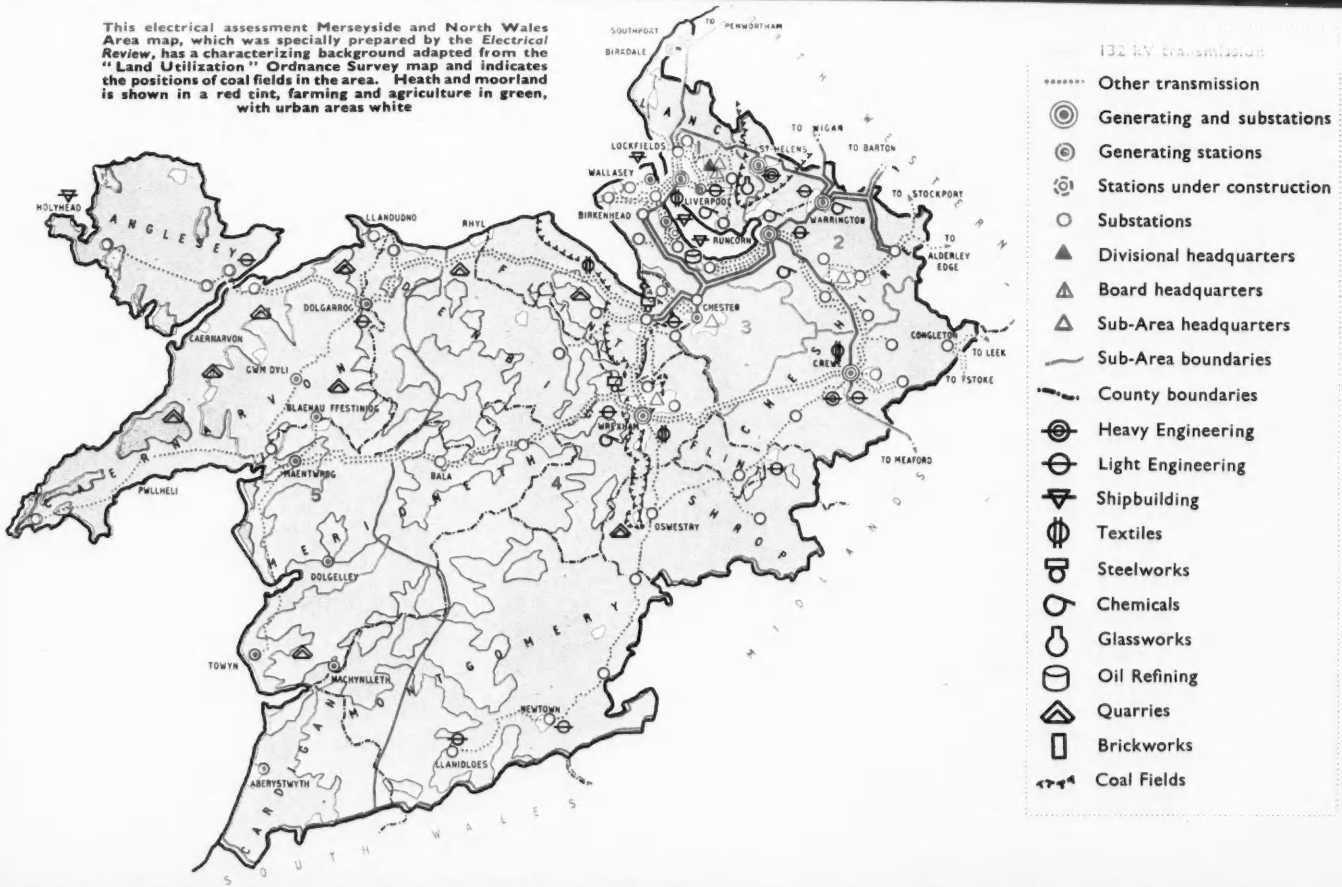
Finally, upon examination of the "Electricity Statutory Supply Areas" map (pre-nationalization), we get the beginnings of the inevitable load analysis at which we aim. To arrange the former undertakings in Sub-Area order will make the locational aspect more informative, and to afford a mental picture of the whole we arrange it with other statistics in tabular form.

We must also supplement it with some general comments on the Area population, which totals about 2.8 million. About 1.5 million of these are centred around Liverpool, the remaining 1.3 million persons being spread over the remaining 4,000 square miles of the Area. Thus we have 60 per cent of the population in 20 per cent of the territory and roughly 40 per cent of the population in 80 per cent of the territory. Even so, the 40 per cent in the larger area is found mainly in the coastal towns.

The Area is exceptional by virtue of the large number of non-statutory undertakings in existence up to vesting day—66 in all serving some 3,000 consumers. While several of these have been taken over by the Merseyside and North Wales Electricity Board, many are still operating independently, the most important

This electrical assessment Merseyside and North Wales Area map, which was specially prepared by the *Electrical*

This electrical assessment Merseyside and North Wales Area map, which was specially prepared by the *Electrical Review*, has a characterizing background adapted from the "Land Utilization" Ordnance Survey map and indicates the positions of coal fields in the area. Heath and moorland is shown in a red tint, farming and agriculture in green, with urban areas white



- Other transmission
- Generating and substations
- Generating stations
- Stations under construction
- Substations
- Divisional headquarters
- Board headquarters
- Sub-Area headquarters
- Sub-Area boundaries
- County boundaries
- Heavy Engineering
- Light Engineering
- Shipbuilding
- Textiles
- Steelworks
- Chemicals
- Glassworks
- Oil Refining
- Quarries
- Brickworks
- Coal Fields

ones being the Llangollen Electric Light & Power Co., Ltd., the Corwen Electric Light Co., Ltd., the Rhug Supply Undertaking, Llandidloes Electricity Supply Co., Ltd., and the Fairbourne Electricity Supply Co., Ltd.

In support of our locational analysis we can say that of the roughly 600,000 consumers in 1947, 341,000 were in the Merseyside district, representing 1,400 per square mile, while 259,000 consumers were spread over the remainder of the Area, representing 16 per square mile.

But to take more up-to-date figures there are now in the Area a total of 661,000 consumers which can be analysed as follows: Domestic, 590,000; commercial, 58,500; industrial, 6,500; and farms, 6,000.

The following information relating to selected large consumers also supports in some measure our locational analysis. John Summers & Sons, Ltd., consume at their Hawarden Bridge steel works about 100 million kWh per annum, about 25 per cent of which they generate themselves. The public supply is used mainly in the hot strip mill where three roughing stands are driven by 2,500 h.p. a.c. motors and five finishing stands by four 3,000 h.p. and one 2,000 h.p. variable-speed d.c. motors. A consumption of about 40 million kWh per year at the Brymbo Steel Works, Ltd., serves mainly for the operation of three 15-ton electrode furnaces.

The electro-chemical processes at the Castner-Kellner works of Imperial Chemical Industries, Ltd., at Runcorn, are responsible for a consumption of about 100 million kWh per year. Similarly, 98 million kWh per year is consumed at the I.C.I. Rock Savage Works, also at Runcorn. The Shell oil refinery at Stanlow, near Ellesmere Port, is in the course of intensive development, and the present consumption of 20 to 25

A land wild and picturesque—the fantasy of Snowdonia

LOCATIONAL LOAD ANALYSIS BASED ON STATISTICS RELATING TO FORMER UNDERTAKINGS IN THE AREA

Sub-Area	Former Undertakings	Area, sq. miles	Consumers	Electricity sold —Million kWh	M.D.— MW
No. 1	...	160	232,668	...	...
	Formby U.D.C.	11.5	2,358	5.8	2.5
	Liverpool Corp.	142.2	207,383	733.6	224.3
	Southport Corp.	28.5	22,927	45.9	19.4
No. 2	...	335	108,258	...	...
	Mersey Power Co., Ltd.	93.7	28,475	296.4	67.3
	Mid-Cheshire Electricity Co., Ltd.	261.3	18,984	52.2	15.0
	St. Helens Corp.	38.7	27,316	146.0	30.6
	Warrington Corp.	51.9	33,483	155.1	41.9
No. 3	...	230	115,550	...	...
	Birkenhead Corp.	61.7	54,030	181.5	48.5
	Chester Corp.	143.3	24,203	62.0	19.4
	Hoylake U.D.C....	9.3	8,780	20.7	7.4
	Wallasey Corp.	9.2	28,528	46.7	16.4
No. 4	...	2,235	107,500	...	...
	Congleton Corp....	8.6	4,141	6.2	2.1
	Connahs Quay U.D.C.	5.2	1,922	1.7	0.7
	Crewe Corp.	6.6	15,021	23.4	7.8
	*Electriity Distribution of North Wales & Dist., Ltd.	1,515.7	6,025	167.5	90.3
	Harwarden R.D.C.	50.9	7,735	22.7	6.6
	Llangollen U.D.C.	—	—	—	—
	Mold U.D.C.	1.8	1,959	2.0	0.7
	*North Wales Power Co., Ltd.	112.0	53,767	49.9	19.5
	Oswestry Corp.	88.7	4,357	9.0	2.9
	Prestatyn U.D.C.	3.2	2,253	3.1	1.1
	Rhyl U.D.C.	1.4	4,549	6.4	2.2
	Ruthin Corp.	3.1	1,028	1.1	0.5
	Wrexham Corp.	4.6	7,546	12.4	4.6
No. 5	...	1,715	38,000	...	...
	Aberystwyth Corp.	1.8	3,009	3.4	1.7
	Bangor Corp.	5.2	4,199	7.1	2.6
	Bethesda Corp.	1.4	1,380	0.7	0.3
	Borth & Ynyslas Elec. Supply Co., Ltd.	—	460	0.5	0.3
	Caernarvon Corp.	3.6	2,781	5.7	2.0
	Colwyn Bay Corp.	11.6	8,371	11.9	5.1
	Conway Corp.	6.0	3,157	5.1	1.6
	Dolgelley U.D.C.	0.9	648	0.2	—
	Holyhead U.D.C.	1.2	2,537	2.3	0.9
	Llandudno U.D.C.	4.4	4,376	11.0	3.7
	Llanfairfechan U.D.C.	7.0	869	0.7	0.3
	Machynlleth Elec. Supply Co., Ltd.	2.0	660	0.4	0.2
	Menai Bridge U.D.C.	2.5	657	0.5	0.2
	Penmaenmawr U.D.C.	6.0	1,478	1.2	0.4
	Towyn, Aberdovey & District Elec. Co., Ltd. ...	—	832	1.0	0.4
	Yale Electric Power Co., Ltd....	25.5	981	1.6	0.8

* The total area previously served by both the North Wales Power Co., Ltd., and Electricity Distribution of North Wales and District, Ltd., is now partly in Sub-Area No. 4 and partly in Sub-Area No. 5, but suitable sectional statistics are not available.

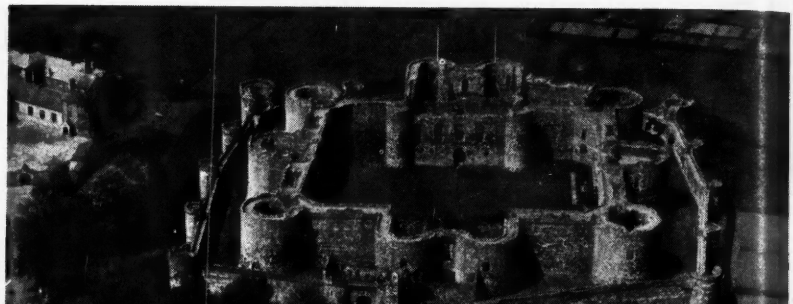
million kWh per annum is expected to be increased to 70 to 80 million kWh a year in a few years' time.

Lever Brothers, Port Sunlight, Ltd., and their associated companies on Merseyside consume in the manufacture of soaps, margarine, etc., about 67 million kWh a year. J. Bibby & Sons, Ltd., Liverpool, make vegetable oils, cattle foods and soaps and consume about 30 million kWh per annum from the public supply.

In order to complete the picture, however, we must bear in mind other industries like shipbuilding on the Mersey, etc., glass manufacture at St. Helens, the collieries in the coal fields already referred to, the slate, limestone and other quarries in the mountainous areas of the north and west, the dairy farming, particularly in Cheshire and Shropshire, and the holiday resorts on the coast.

We now broaden our locational analysis by means of the following rounded off 1948-49 demands for the various load centres:—

Load Centre	kW	Load Centre	kW
Liverpool ...	... 268,000	Bebington ...	9,000
Runcorn ...	... 50,000	Port Sunlight ...	12,000
Warrington	... 50,000	Ellesmere Port ...	12,000
St. Helens ...	... 36,500	Chester	13,000
Southport	... 20,000	Hawarden Bridge	18,000
Wallasey ...	... 17,000	Wrexham ...	10,000
Birkenhead	... 20,000	Hoylake	9,000



The thirteenth-century Beaumaris Castle in Anglesey is part of the Area's history

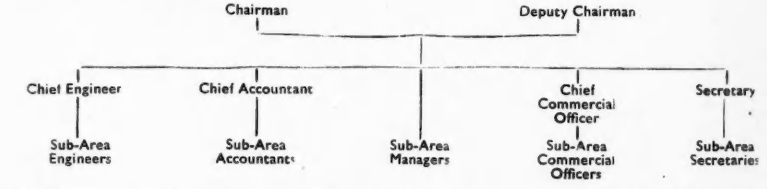
The remaining 85,500 kW was scattered very widely over the teritory in small blocks ranging from 200 kW to 7,000 kW.

The concentration of load on Merseyside is due, of course, to the development of industry within the proximity of the country's second largest port, Liverpool, and concomitant large-scale urban development resulting in correspondingly heavy domestic consumption. These demands were created in the aggregate by a consumption of 2,500 million kWh throughout the Area, and on this consumption basis we present our final load analysis (see table in next column).

Consumer service centres are, of course, an important part of any electrical assessment, so we include those in the Merseyside and North Wales Area in Sub-Area order, as follows: *No. 1 Sub-Area:* Formby, Huyton, Liverpool, Maghull, Prescot, Speke and Southport (two). *No. 2 Sub-Area:* Ellesmere Port, Knutsford, Northwich, Runcorn, St. Helens, Warrington and Widnes. *No. 3 Sub-Area:* Birkenhead, Chester, Hoylake, Moreton, Wallasey. *No. 4 Sub-Area:* Crewe, Congleton, Flint, Hawarden, Johnstown, Llangollen, Mold, Nantwich, Newtown, Oswestry, Presta-

Load	Percentage total consumption
Industrial	50
Domestic	32
Commercial	12
Railways, Other Traction & P.L.	5
Farms	1

Merseyside and N. Wales Board Organization



The Chairman and principal officers of the Merseyside and North Wales Electricity Board. Left to right: Messrs. J. Eccles, D. P. Oliver, P. d'E. Stowell, J. Rankin, E. J. Lollar and W. Gilchris

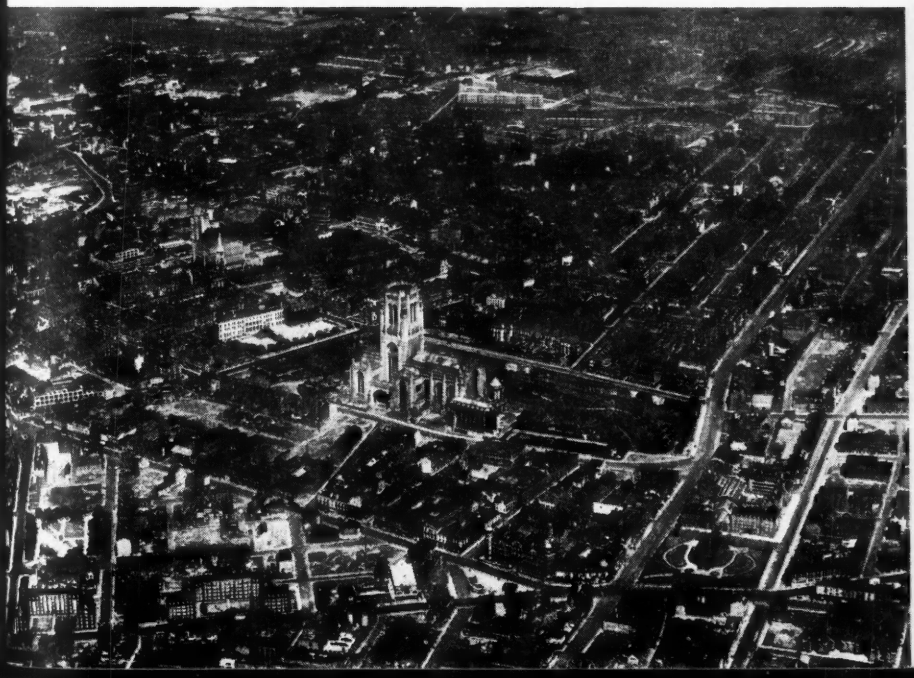
tyn, Rhuddlan, Rhyl, Ruthin, Sandbach, Whitchurch, Wrexham. *No. 5 Sub-Area:* Aberystwyth, Bangor, Barmouth, Bethesda, Blaenau Ffestiniog, Caernarvon, Colwyn Bay, Conway, Llangefni, Llanrwst, Penmaenmawr, Pwllheli, Towyn, Llandudno.

A further important assessment point, and one which has presented quite a problem to the Board, is that relating to tariffs. All of the comparatively large number of undertakings formerly operating in the Area had their own scales of charges. Prices ranged for lighting from 3d per kWh to 1s per kWh, and for heating from 0.5d to 3d per kWh. The domestic two-part tariffs included as the bases for fixed charge assessments, rateable value, number of rooms, floor area, and wattage of installed lamps; the running charges associated with these ranged from 0.33d per kWh to 1.5d per kWh. Extensive tariff ranges also prevailed in the industrial, commercial and other fields.

While the policy of the Board so far has been to maintain the tariffs generally at the pre-vesting-day levels, within the constituent areas of the former undertakings a certain amount of levelling out has been done by increasing low tariffs to a minimum of 0.75d per kWh and decreasing high tariffs to a maximum of 6d per kWh.

The functions of the new controlling organizations are now well understood, so that it will be appreciated that what has already been said in this article,

Liverpool—where Ferranti was born—whose traditional culture is expressed in the new cathedral



apart from the characterization and definition of the area, relates mainly to the Board, whereas what is to follow these direct references to the new organizations is the concern mainly of the Division.

Both the Board and the Division have settled down with their headquarters in Liverpool, the Board in a large modern commercial building in dockland—Electricity House, Love Lane, Pall Mall, Liverpool, 3—and the Division in a converted large residence in a public park—British Electricity House, Clarke Gardens, Woolton, Liverpool.

At Love Lane, Mr. J. Eccles and Mr. D. P. Oliver, chairman and deputy chairman of the Board, work with their principal officers as the major executive team, the chief officers being: Mr. P. d'E. Stowell, chief engineer; Mr. E. J. Lollar, chief accountant; Mr. W. Gilchrist, chief commercial officer; and Mr. J. Rankin, secretary.

Similarly, at Clarke Gardens, Mr. A. R. Cooper, the divisional controller, has his executive team, the principal officers being: Mr. R. L. Batley, chief generation engineer (operation); Mr. F. H. S. Brown, chief generation engineer (construction); Mr. A. N. Duffett, generation engineer (construction); Mr. J. A. Spence, transmission engineer; Mr. E. A. Burton, technical engineer; Mr. E. Butterworth, divisional secretary; and Mr. A. H. Campbell, divisional accountant. The main structures of the new organizations are indicated by suitable "trees."

Associated generally with the former undertakings previously mentioned in this article there are now 21 power stations in the Area operated by the Division, and they have a total effective capacity of 585 MW. During the year 1948/49, the energy generated by these stations amounted to 2,634.9 million kWh; the energy sent out from the stations, plus that purchased, totalled 2,491.4 million kWh; 2,751.9 million kWh was supplied to the Board; and about 300 million kWh was imported from other Divisions.

Before presenting what has now become a common feature of these survey articles, the schedule of the generating stations in the Area, a few relevant comments will render the schedule more useful. There are very few large and medium size stations and a comparatively large

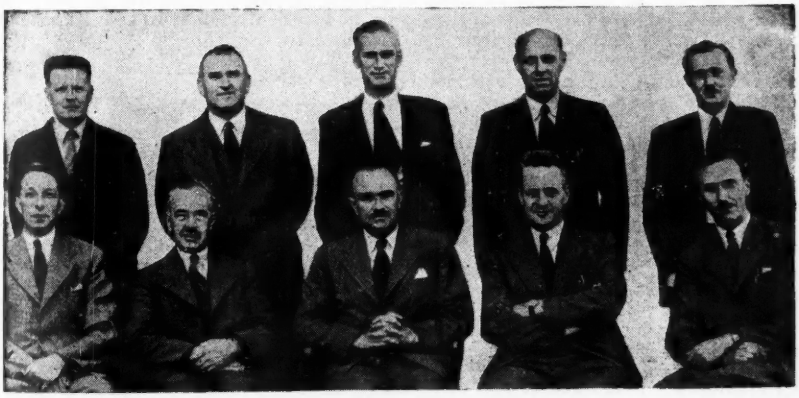
GENERATING STATIONS OPERATED BY THE MERSEYSIDE AND NORTH WALES DIVISION

Station	Previous Owner	Installed Generator Capacity —MW	Effective Output Capacity —MW	Type of Plant	Method of operation—shifts per day
Clarence Dock	Liverpool Corp.	257.0	244	Steam	3
Lister Drive	Liverpool Corp.	66.75	59	Steam	2
Southport	Southport Corp.	17.25	11	Steam	2
Warrington	Warrington Corp.	60.0	57	Steam	2
St. Helens	St. Helens Corp.	24.0	16	Steam	2
Wallasey	Wallasey Corp.	22.5	17	Steam	2
Port Sunlight*	Lever Bros. Port Sunlight, Ltd.	16.25	8	Steam	2
Percival Lane	Mersey Power Co., Ltd.	127.5	113	Steam	3
Queensferry	Chester Corp.	5.5	5	Steam	1
Crewe	Crewe Corp.	1.23	1	Steam	1
Birkdale	Birkdale Dist. Elec. Supply Co., Ltd. ...	1.14	1	Steam & Oil	1
Wrexham	Wrexham Corp.	0.78	0.7	Steam	1
Aberystwyth	Aberystwyth Corp.	3.07	3	Oil	3
Maentwrog	N. Wales Power Co., Ltd.	24.0	24	Hydro	2
Dolgarrog	N. Wales Power Co., Ltd.	17.7	18	Hydro	3
Cwm Dyli	N. Wales Power Co., Ltd.	6.5	5	Hydro	2
Machynlleth	Machynlleth Elec. Supply Co., Ltd. ...	0.5	0.5	Hydro & Oil	3
Towyn	Towyn, Aberdovey & Dist. Elec. Co., Ltd....	0.55	0.5	Hydro & Oil	2
Dolgelly	Dolgelly U.D.C.	0.15	0.1	Hydro & Oil	2
Blaenau Festiniog ...	Yale Elec. Power Co., Ltd.	0.59	0.6	Hydro	2
Dee Bridge	Chester Corp.	0.63	0.4	Hydro	3
		653	585		

* Owned by Lever Bros., Port Sunlight, Ltd., but operated by the Division.

number of small stations. Clarence Dock easily heads the list with an effective capacity of 244 MW; it is more than twice the size of the second largest station, Percival Lane (113 MW). Thus the two leading stations represent about 60 per cent of the effective capacity in the whole Area. Add to this Warrington (57 MW) and Lister Drive (59 MW) and we have in the four largest stations about 80 per cent of the effective capacity of the Area. The fifth station in size is Maentwrog, the largest of the hydro-electric stations with an effective capacity of 24 MW or about double the combined effective capacity of the remaining hydro stations. Nevertheless the total effective capacity of all the hydro stations—about 50 MW—is about 8 per cent of the total effective capacity for the whole Area and

The Merseyside and North Wales Division executive team. Front row, left to right: Messrs. E. Butterworth, J. Warnock, A. R. Cooper (controller), R. L. Batley and F. H. S. Brown. Back row, left to right: Messrs. J. A. Spence, E. A. Burton, A. H. Campbell, D. F. Grant and A. N. Duffett



Eight per cent of the generating capacity in the Merseyside and North Wales Area is afforded by hydro-electric plant. This is a view of the largest of the stations, Maentwrog

quite a high figure for any of the fourteen Areas. Indeed, the only other Area having reasonably sized hydro stations is South West Scotland.

Three new power stations are now under construction in the Area—Bromborough (Birkenhead) which is to have an ultimate capacity of 200 MW and is expected to be started in 1950 with an initial capacity of 50 MW; Connah's Quay (Queensferry) which is finally to have 180 MW of plant and is likely to be in commission in 1954 with its first two 30 MW sets; and Bold (St. Helens) which will have a total capacity of 120 MW, and is likely to be on load in 1953 with two 30 MW sets running. Further, the construction of a 100 MW extension at Clarence Dock is now well under way, as is a 30 MW extension at Warrington. The catchment area of the Dolgarrog hydro station is being extended, but while this is designed to increase the station output, the station capacity will remain unchanged.

The following are the main substations (with their transformer kVA capacities) on the primary transmission system throughout the Area: Southport (30 MVA); Ormskirk (20 MVA); Liverpool, Lockfields (135 KVA); Liverpool, Vulcan Street (60 MVA); St. Helens (40 MVA); Warrington (45 MVA); Knutsford (40 MVA); Runcorn (90 MVA); Chester Town (40 MVA); Chester Main (60 MVA); Birkenhead (90 MVA); Crewe (60 MVA).

We are indebted to Mr. Eccles and Mr. Cooper and to their principal officers for help in the investigation which has made this contribution to our National Supply Survey possible.

Progress at Prince Rock

SOME information about the construction of the Prince Rock power station, Plymouth, is contained in the monthly newssheet of John Laing & Sons, Ltd. Work on the site started in May, 1948, and the foundations are now almost complete. After site clearance the job of excavating 100,000 tons of rock and 7,300 tons of quarry waste began, and because of the proximity of the existing power station buildings explosive charges had to be reduced. Some 12,000lb of powder and gelignite was used in charges varying from 4oz to 10lb. Work is progressing on the building of the first of the two chimneys.

Soil Warming

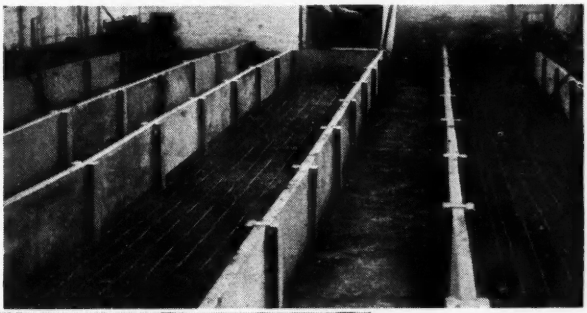
Success of Electrical Methods in Growing Flowers

By E. C. CLAYDON*

THE period up to and immediately following Christmas is an important one from the point of view of the flower grower. His choice of subjects is limited normally to chrysanthemums and early flowering bulbs, together with such pot plants as solanum, various species of primula and azaleas. Once the chrysanthemums are over, which is usually by Christmas, he is faced with a shortage of material suitable for wreaths and decorative work of an ambitious nature.

The progressive grower is alive to this situation and is always on the look-out for variety and something which will attract the market. The latest varieties of amaryllis may fill the bill. These lovely South African lilies have long been popular as summer flowers but their appearance at Christmas and New Year is something of a novelty and due to the application of electricity to horticulture.

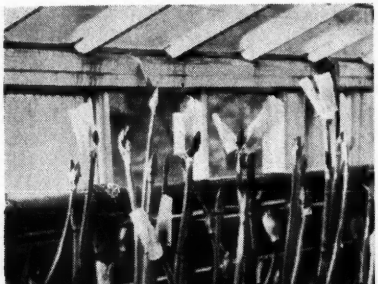
Mr. Read, of Saxon Nurseries, Hankham, Sussex, realized the possibilities of these flowers and last autumn decided on a trial installation to test the market potentialities of the crop and to master the technique of growing by new methods. Accordingly, three rows of prefabricated concrete hot-beds were laid down in a span-roofed house some 50ft long by 15ft wide. Series-parallel soil-warming grids were laid in the beds and fed from a 4.5 kVA transformer. The loading was arranged to give a dissipation of some 10 W per sq ft of bed surface. The beds were then filled with specially prepared compost to a depth of a foot and the heating switched on until a steady average temperature of

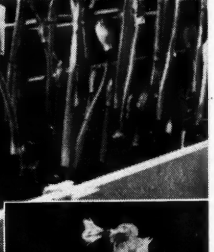


Above: Series-parallel soil-warming grids laid in three rows of prefabricated hot beds

Left: The beds planted, with (in the background) the 4.5 kVA transformer which feeds the warming grids

* Mr. Claydon is Sub-Area agricultural engineer, South Eastern Electricity Board.





Above: Flower spikes in various stages of growth

Right: "Floodlit" vase of five amaryllis flower spikes

80 deg F was reached in the beds. In the meantime, the amaryllis bulbs, which had been held in cold storage for some weeks, were brought out and placed in batches in an electric pasteurizing bath and left there for two hours. They were then planted in the warmed compost. The house was maintained at about 50 deg F and the soil temperature at 80 deg F.

Growth was unbelievably rapid and after three days flower spikes were showing and some had reached a height of six to eight inches. Flowering commenced within three weeks. Some bulbs give two spikes and three or four are not uncommon. After flowering, the bulbs throw up their foliage and build themselves up for the following season.

The difficulty of electric soil warming in the past has been to devise growing methods which would reduce to a minimum the amount of electricity consumed and justify the use of this costly form of heat for food crops. Much success has been obtained by "dosage" methods and the soil pre-heating technique, to mention only two of the recent developments.

Advantage was taken of the interest aroused by these flowers to stage a showroom window display at Eastbourne in which a "floodlit" vase of five flower spikes was shown against a black background. The flowers prompted an article in the local Press. Explanatory leaflets giving cultural details and particulars of soil-warming equipment were prepared and distributed by the showroom staff to inquirers. The installation was designed and carried out by the South Eastern Electricity Board (East Sussex and South West Kent Sub-Area: manager, Mr. N. Boydell, M.I.E.E., A.M.I.Mech.E.) using G.E.C. equipment.

Small Electronic Analyser

A BANTAM-SIZE electronic differential analyser, a midget beside its 100-ton computing machine, has been announced by the Massachusetts Institute of Technology.

The new machine can solve at high speeds and with moderate accuracy; it has been used by many departments at the Institute to determine chemical reaction rates, communication theory and heat distribution. The analyser presents answers to its problems as graphs on a television-like screen. Each solution is completed in 1/100 second and is presented 60 times each second until other information is provided.

The construction of the new machine, which needs no more space than an ordinary office desk, was supported in part by the Signal Corps, Air Material Command and Office of Naval Research under a joint contract with the M.I.T. Research Laboratory of Electronics.

Brussels Congress Report

THE publication is announced of the report on the eighth Congress at Brussels (September, 1949) of the Union Internationale des Producteurs et Distributeurs D'Energie Électrique (UNIPEDE) which was attended by 400 representatives from European countries, including the B.E.A.

The Congress report, which includes the 85 papers read, together with the discussions, in French, comprises two volumes, each of 800 pages, obtainable at a cost of 8,000 Fr. francs from the secretary-general, M. L. Chalmey, 12, Place des Etats-Unis, Paris (16), France.

Physical Society Exhibition

Display of Scientific Instruments

THE customary display of scientific instruments and associated apparatus organized each year by the Physical Society is being held (31st March to 5th April) in the Physics and Chemistry Departments of the Imperial College, South Kensington. This is the fifth post-war exhibition and the thirty-fourth of the series held primarily for the purpose of indicating advances in the design of scientific instruments and the developments in measuring technique during the previous twelve months.

As has been the case in past years, a wide diversity of products covering almost every aspect of measurement is shown by manufacturers which, with the demonstrations being given by research organizations and the universities, illustrates the ever-increasing application of physical principles to the solution of industrial and allied problems. In all, there are 125 exhibitors, 15 fewer than last year, comprising 106 in the trade section of which the greater number are electrical, and 19 in the research and educational section. After being discontinued during the war years, the craftsmanship and draughtsmanship competition was revived last year and it is being held again. A panel of judges will award prizes and certificates in recognition of ability and also to encourage the development of skill among apprentices and learners.

Technical Discourses

In the first of the usual discourses, of which there are four this year, Prof. S. Chapman (University of Oxford and president of the Physical Society) will deal with solar physics and the *aurora polaris*, and Dr. W. D. Wright (Imperial College, London) is to speak on colour vision and colour television.

Any system of three-colour reproduction depends on the possibility of matching a large range of colours by an additive mixture of red, green and blue, a property of the eye which seems to find its most direct application in colour television. Various methods have been proposed for producing and synthesizing separate red, green and blue pictures, but their relative merits are partly determined by the extent to which brightness and definition can be sacrificed for colour. This raises interesting questions about the role of colour discrimination in visual perception.

Dr. F. J. Scrase (Meteorological Office) will make an historical survey of the methods of exploring the meteorological properties of the atmosphere up to great heights and discuss recently developed British methods of sounding the upper air, using radio and radar techniques.

A broad survey of the main physical characteristics of the earth's atmosphere will be made by Sir Robert Watson-Watt (President of the Royal Meteorological Society) leading to a rough outline of the study of the ionosphere.

Application of Electronics

The exhibition, to which further reference will be made in a later issue, although smaller than the last two, amply fulfils its purpose of presenting modern trends and practices in instrument design and manufacture. The majority of the well-known indicating instrument manufacturers are represented and a preview of their exhibits indicates that their activities have been devoted mainly to the redesign and improvement of existing models. The fullest advantage is being taken of newly developed magnetic materials.

It is evident that use of electronic techniques is growing at an ever-increasing rate. There are amplifiers for both d.c. and very low- and high-frequency a.c.; voltage and current stabilizing units; oscilloscopes for a multiplicity of purposes, some of which are multi-channel with recording facilities; light-measuring instruments; industrial control devices; servo-mechanisms, computers and many others. Several examples of the magnetic amplifier are also on view.

WHOLESALERS' DINNER

E.W.F. President on Trade Relations

THE principal guest at the annual dinner of the Electrical Wholesalers' Federation at the Savoy Hotel, London, on 23rd March was the Rt. Hon. Oliver Lyttleton, P.C., D.S.O., M.C., M.P., chairman of Associated Electrical Industries.

Mr. Lyttelton proposed the toast of the Federation in a witty speech interlaced with some shrewd political comments. He said that ignorance of the function of the merchant was widespread among the public. The distributor's rôle was ignored by our present rulers but good distribution was a measure of civilization.

There was a bright future for the electrical industry if the Government could be persuaded to keep its hands off. He believed, however, that the tide of nationalization was receding and he looked forward to a country without national boards, controls and licences.

Manufacturers' Recognition

In the course of his response, Mr. J. W. E. Rutherford, F.C.I.S., president of the Federation, said that in a large part of the political field the wholesaler was regarded as an unnecessary evil; yet even the obviously biased Simon Report was a complete justification of the genuine wholesaler.

The great majority of manufacturers recognized the vital part played by the wholesalers in the industry. Many of them relied entirely on wholesalers to distribute their products and found that this policy paid handsomely. Those who endeavoured to cut out the wholesaler often changed their methods when it was necessary to fight for business.

There had been attempts to attack the wholesalers' margins at a time when they were faced with rising labour and overhead costs. He warned those concerned not to throw away the goodwill patiently cultivated over past years and lose the loyal service of tried and proved servants.

Makers of domestic appliances and accessories were finding it difficult to sell the whole of their output. They would not succeed by increasing the number of wholesale outlets. Perhaps if they had another look at their product or its price they might find themselves nearer a solution. The Federation did not advocate the "closed shop" and did not impede the entry of genuine wholesalers into the industry. The genuine wholesaler provided worthy premises and staff, gave advice and arranged efficient delivery. Members of the Federation did not just buy in bulk to distribute to their own organization. He hoped that the B.E.A. would now have a better idea of the difference between the work and the remuneration of the wholesaler and the advantage which necessarily accrued to quantity buyers, often of only a limited number of products.

There was a tremendous pent-up demand for all kinds of electrical products but many things prevented its satisfaction including plant shortage, financial controls, export needs, etc., but those who still retained their faith could see the good days yet to be. The wholesaler had been reared under hard competitive conditions and his survival had proved his fitness to occupy a proud place in the electrical industry.

The health of the guests was proposed by Mr. W. H. Swain, past-president. He said that there were present the chairmen and principal executives of nearly all the principal electrical associations.

Mr. H. A. Deacon, member of the E.L.M.A. Council, responding, said that he spoke on behalf of all the guests "from the electrical Press down to Mr. Oliver Lyttelton." He said that he had happy business and social relations with the E.W.F. for many years. The company much enjoyed some stories with which Mr. Deacon adorned his speech.

Power Plant Production

Mr. B. H. Leeson, O.B.E., director of the B.E.A.M.A., also replied for the guests. He said that the wholesalers were an essential part of a very great industry. They were unsubsidized and had to pay their way or fade away. Profit was nothing to be ashamed of; it was the index of efficiency and good service.

The shortage of power and the purchase tax were limiting expansion. As regarded the shortage of plant, Mr. Leeson said that the manufacturers were doing their utmost. They had more than doubled their productive capacity since the war. They claimed to be able to equip power stations as fast as the British Electricity Authority could build them.

The health of the president was proposed by Mr. J. M. Hollander, B.Sc., M.I.E.E., vice-president of the Federation, and Mr. Rutherford replied.

Railway Traction

I.E.E. Convention Discussions in London

SOME forty foreign and overseas delegates attended the convention on electric railway traction at the Institution of Electrical Engineers in London last week. The addresses and papers presented at the meetings were reviewed in our last issue.

At the Council dinner which followed the inaugural session, visiting delegates were invited to inspect the substations control room and car sheds of the newly electrified Liverpool Street-Shenfield line (Eastern Region) on the first day; to examine a multiple-coach train, an electric locomotive and a diesel-electric locomotive at Waterloo (Southern Region) on the second day; and to tour the L.P.T. repair works (London Underground) at Acton on the third day.

Early Projects

Following the three inaugural addresses Mr. H. H. Swift (British Railways) opened the discussion by mentioning that some of the original motors and control gear built for the Tyneside electrification in 1904 were still in operation. He recalled that one of the sections of the Manchester to Bury conversion of 1913, at 3,000 V overhead, was one of, if not the, earliest electrifications in the world at that voltage. It gave great assistance and encouragement to engineers when dealing with 3,000 V schemes after the war. Experience of the Shenfield scheme showed that concrete surface troughing for cables cost more than double the concrete post route, but the use of pre-stressed concrete ducting was being investigated. Aerial cables could not be used because of the number of bridges. It was to be hoped that one day the grid would be so greatly extended as to provide an easy and cheap connection to each traction substation, as in Holland.

Mr. F. A. A. Mensler (London Transport Executive), speaking as an actuary, said that the capital expenditure estimated by the Weir Report amounted to nearly £350 million; from a comparison of the index of wholesale prices in 1932 and to-day it appeared that the present figure might be £1,000 million. Unfortunately, railway electrification had to queue with many other projects; the development of the electricity supply industry would require £500 million, what was described as the first stage of the steel industry reorganization wanted £250 million, while the coal industry would be modestly content with £150 million by 1952. Some economic priority had therefore to be laid down, but the saving in coal should give railway electrification a high place in the list.

Mr. G. H. Fletcher (Metrovick) said that when in Berlin in 1938 he saw at the A.E.G. works the completion of a rectifier locomotive and heard something of its history. Although four firms began work on such locomotives, A.E.G. was the only one to build a locomotive and it said that it would not make any more, because it was uneconomic; the locomotive became too heavy when it had to carry the rectifier and so on. There were, therefore, other objections to this type of locomotive besides its effect on telecommunications.

Swedish Electrification

Mr. Th. Thelander (Swedish State Railways) claimed that railway electrification had been indispensable to Sweden, strengthening the position of the country and giving it a valuable independence in hard times. In all electrification schemes carried out since 1923 they had used single-phase a.c. at 16⅔ c/s produced by motor generators connected to the common h.v. network of the country through 16 kV overhead lines. A very flexible system had been provided, suitable alike for heavy freight traffic over long distances, suburban traffic and express trains. The average distance between feeding points was 65 miles.

Mr. C. O. Boyse (B.I.C. Construction Co.) agreed with Mr. C. M. Cock that the

cost of overhead equipment had been rising enormously, for reasons that were mostly mechanical or structural. The amount of copper to be hung in the air over a railway had a big influence on the ultimate cost of the equipment, for every additional ounce of copper meant a little more expense in the fitments for holding it up. An important factor making for economy was continuity of work and to obtain it co-operation was required. There was room for economy in design.

M. Garreau (French National Railways) said he was wholly in agreement with the author that it would be necessary to await the results of experience in France with the single-phase 50 c/s system before coming to a decision. Three locomotives of 3,000 to 3,800 h.p. were now under construction in France and the motors for one of them had already undergone a works test with satisfactory results. The test line from Aix-les-Bains to La Roche-sur-Foron in French Savoy was in process of being equipped and he thought that the first single-phase 50 c/s locomotive would be able to run on this line in August.

Mr. W. S. Graff-Baker (London Transport) said his life as a mechanical engineer with an electrical training had taught him that the electrical engineer's problems were in the main mechanical, both in design and maintenance. When a railway was electrified, the problems of the civil engineer became worse, those of the electrical engineer were more difficult and the life of the mechanical engineer was not made easy. They were all in it together and it was by working together that a successful job of railway electrification could be carried out.

Advantages of Electrification

Mr. G. Wansbrough, as a "layman," deplored the modesty of engineers in this matter and suggested that they were not making nearly enough of the tremendous advantages which railway electrification could offer. It would give the railways a chance to get back to what he believed to be their proper place in the transport system of the country and to adopt once more the sort of approach that they had to their job when they were first founded and were giving something which did not exist before.

Mr. T. J. Aldridge emphasized that if designers would leave a little more space for the brake equipment the problem of wear would be very much simplified.

A number of other speakers discussed points of detail and the author briefly replied.

Speed and Reliability

The second session (chairman: Sir John Hacking) dealt with traction.

Mr. A. H. Grainger (London Transport Executive) said the call for speed constituted an almost daily challenge to reliability. In a large measure the electrical engineer had been able to meet that challenge, but this had resulted in a great increase in the amount of equipment on the track-side and in the train. He felt that, good as the standard was today, there was still room for a closing of the gap between present-day standards of reliability and absolute reliability. Of course, the nearer one got to perfection, the more technically difficult it became and the more expensive to close that gap. He felt that electrical engineers should explore the possibility of cutting down the cost of equipment, both first cost and maintenance cost. It might well be that the answer would be found in the research laboratory or on the design table.

Mr. J. H. Short (English Electric Co.), referring to Mr. Hippisley's paper, commented on the author's reference to the slow development of large diesel-electric locomotives in Great Britain. It was a fact that diesel engines had been built in this country since 1904 and had been available in all sizes. He thought there were other reasons for the lack of development of large diesel engine locomotives in this country than the lack of engines. This was a small country and although it was very densely developed from the railway point of view, there were not many opportunities for the adequate use of large diesel-electric locomotives. There was, however, great opportunity for the development of diesel-electric shunting locomotives, and development in that direction had been taking place.

Mr. H. H. C. Barton (Merz and McLellan), who also referred to Mr. Hippisley's paper, said that hitherto it had been the practice, when examining electrification projects, to compare the

annual cost of operation by steam and electricity of the same traffic. He wondered whether a more realistic way of tackling the problem would not be to imagine that the deck was swept entirely clean and to compare the capital estimate of providing modern steam equipment and up-to-date electrical equipment. Speaking as a passenger, he felt that much of the steam equipment was obsolescent and some of it was in a very bad state indeed. He also suggested that it would be a good idea to have a small circular test track on which some of the excellent things that had been developed could be tried out without their interfering with ordinary working.

Mr. W. R. Cox (General Electric Co.) called attention to a new development in the power supply to the Shenfield line, namely, the combined use of the cables along the track-side for public supply and traction. On the subject of supervisory control, which was used to a large extent in railway work, one thing that must be very carefully watched was that the operation of the supervisory gear was quick. There were many signals to be sent out in the course of starting up in the morning, and in times of trouble there was the simultaneous return of a large number of fault signals. These must come back quickly in order to give the attendants a proper appreciation of the position before they started to take action.

Dr. J. C. Read (B.T.H. Co.) said that the new type of substation plant described by Messrs. Pick and Dell was deserving of much credit. The totally enclosed fan-cooled transformer was easily the best solution that had been found so far to the fire risk in transformers in built-up areas, and the building up of the rectifier equipment from a number of standardized building blocks, on so-called "Meccano" principles, was obviously of great help in the present stage of transition when a great deal of obsolete plant had to be replaced and new plant frequently had to be installed in congested spaces.

Dr. W. G. Thompson referred briefly to developments which were taking place with the object of reducing the size of rectifiers and further improving them.

Prof. Semenza (Italy) gave an account of electrification in Italy.

Track Wear

The third session (chairman: Mr. E. T. Hippisley) dealt with project considerations.

Mr. L. G. B. Rock (Civil Engineering Department, Southern Region) opened the discussion with a reference to the top

A Convention group at Waterloo Station in front of electric locomotive No. 20003

wear of rails which, he said, was undoubtedly attributable to the high proportion of load to wheel diameter. That was confirmed by a large number of tests carried out on a line for another purpose. After some 2,800 readings it was evident that maximum contact pressure on the surface of the rail was 10 per cent higher with multiple unit electric trains than with steam locomotives travelling at comparable speeds. The pressure was eased slightly as the tyre became slightly hollow, but excessively worn tyres, while reducing contact pressure, gave rise to other troubles.

Mr. W. G. Jowett (English Electric Co.) referred to the 15 per cent given by Mr. W. J. Webb as the maximum permissible voltage drop for a main line system for the stated accelerating condition. Since the electrical equipment was usually designed for a voltage approximately 10 per cent under the substation full load busbar voltage and also bearing in mind the limited number of accelerations in main line service, it might well be that 15 per cent was too conservative.

Mr. E. A. K. Jarvis (English Electric Co.) mentioned that another way of saying that improvement of the conductance would reduce losses was that improvement of conductance would permit greater spacing between substations for the same losses. A recent investigation of variations in copper size from 0.5 to 1.25 sq in showed very little change in capital cost. Admittedly the cost of the copper increased with greater section, but that permitted wider substation spacing for the same voltage drop. With greater spacing the substation cost was less and that offset the greater cost of the copper.

Motor Suspension

Mr. W. S. Graff-Baker (London Transport Executive) said he was surprised to learn that the steam locomotive was no more damaging to the track than the multiple-unit electric train, in spite of the fact that the whole of the rotating parts of an electric bogie were balanced, whereas it was quite impracticable to balance the moving part of the steam locomotive. A problem which had been imposed upon engineers was the comparatively large mass of two motors in a bogie which could oscillate laterally; the inevitable tendency was for the bogie to take a sinusoidal course and, once that mass started, it could only be stopped by contact of the rear flange with the side. Experiments were in hand on means of suspending motors so that they were sprung vertically.

Mr. E. Dibben, referring to Mr. Webb's paper, said that on the Great Indian Peninsular Railway there were two substations and at least one track cabin "out in the blue," more than two miles from a station. The transportation staff took a poor view of stopping trains to let maintenance men get out. Therefore, there would appear to be a lot to be said for moving substations nearer to the railway station and the track cabin.

Mr. H. J. Guthrie (Irish Railways) said that some further information about the effect of diesel-electric locomotives on the track would be useful, as they were identical with electric traction from the point of view of riding qualities, plus the heavy weights in the superstructure.

Italian Bogie Design

Signor d'Abella (Italy) said that in the latest style of bogie designed for the Italian State Railways rubber pads had been used between the wheel and the motor so that all the lateral oscillation of the motor, which was nose-suspended, was eliminated. Diminution of the wear of the wheel ring resulted.

Mr. E. C. Dunton also referred to lateral movement. From his experience of London Transport permanent way maintenance it had to some extent been useful to reduce not only the mass, but also the amplitude of the oscillation. London Transport also had its tracks tightened, which had been helpful. Sinusoidal movement was not self-synchronizing; therefore, there was no *a priori* reason why any two successive bogies should follow in the same track and do damage. Any kind of concreting-in, if it were done correctly and accurately to produce a very perfect gauge, must reduce the extent of synchronizing defects. Another thing was to get rid of joints which were a natural source of weakness.

After other speakers had taken part, the authors briefly replied.

A report of the discussions at the later sessions of the Convention will be published in next week's issue.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents

Home-lighting Practice

WHILE current lighting practice in factories, offices, streets and other places open to the public is fairly evident it is not so in the case of private dwellings and consequently it is difficult to assess progress in home-lighting practice.

It will be recollected that B.S. Codes of Practice for the lighting of dwellings based on the recommendations of the Lighting of Buildings Committee of the D.S.I.R. were published some three years or so ago. The extent to which the code recommendations have been followed in the dwellings erected since then would provide a basis for an estimate of progress in this field.

I am wondering whether you would be good enough to invite your readers to say, from their own observations, whether the provision of the recommended lighting facilities has been made in either temporary or permanent houses, bearing in mind that the codes stipulate not only the number and the position of lighting points, but also the provision of complete fittings by the landlord.

Lingfield, Surrey. J. B. CARNE.

Delivery Periods

IN your issue of 10th March you refer to the shortcomings of the latest volume of the O.E.E.C. publication listing export availabilities and delivery periods of machinery and equipment. We agree wholeheartedly with your comments and would like to draw attention to the fact that, so far as plant of the type in which we specialize is concerned, it is completely omitted from the list of United Kingdom availabilities.

Under "Section 8130—Industrial Electrical Equipment" seven countries include electric furnaces or industrial furnaces in their lists. It is indeed strange that the products of firms in the United Kingdom, in many respects far in advance technically of those of other listed countries, should be ignored by those compiling the lists. We do not know who is responsible for the collection of the information on which the publication is based, but surely reference to B.E.A.M.A. as far as electric furnaces are concerned, or to one of the Government Departments which demand regular returns of output and therefore must be aware of the fact that industrial furnaces are made in this country, would have avoided such an omission.

We can only hope that representations will be made in the proper quarter that this particular section of British industry should not be overlooked in future issues, for if the publication is to serve any useful purpose, the achievements and capabilities of the United Kingdom should clearly be presented as favourably as those of other O.E.E.C. countries.

WILD-BARFIELD ELECTRIC
Watford. FURNACES, LTD.
J. E. ORAM,
Director and General Manager.

Milk Cooling

THOSE of us who are concerned with the subject of milk cooling would like to pay a tribute to Mr. Cameron Brown for his consistent interest in the development of the chilled-water system. He was certainly instrumental in pre-nationalization days in encouraging the supply companies with which he was associated to construct prototype plants which were put out on farm test. In this way he did valuable pioneer work and stood almost alone.

I cannot, however, accept Mr. Cameron Brown's statement in his article (*Electrical Review*, 17th March) that it was a demonstration at an Oxfordshire farm which gave the Milk Marketing Board an inkling of what could be done. The writer and a colleague visited this farm with Mr. Cameron Brown in August, 1947, but

in the previous month the Board had already exhibited on its stand at the Royal Show at Lincoln an effective chilled-water cooler manufactured by a Birmingham company with whom we had been in negotiation earlier that year. Mr. Cameron Brown was one of the many visitors who examined this plant and commented favourably upon it.

I share Mr. Cameron Brown's regret that equipment manufacturers failed to develop chilled-water coolers prior to the war and must claim some credit for the Milk Marketing Board in focusing attention upon the need, and potential demand, for an effective cooler so designed that it could be marketed at a price capable of attracting substantial sales. Mr. Cameron Brown has all along realized the importance of the economic as well as the technical side of the problem. Happily, the solution has now been found and experience has confirmed that there is a large potential demand for a chilled-water cooler of the right design and price. Dairy farmers are rapidly becoming refrigeration minded.

Thames Ditton. H. EBDON,
Deputy Marketing Officer,
Milk Marketing Board.

Cooling Towers

IN their letter (*Electrical Review*, 24th March) Messrs. Wood and Betts have attempted to improve upon the suggestions put forward by Mr. Simpson in his article, and this is all to the good.

One might, however, ask why they suggest a figure of 3,450 B.Th.U./kWh for practical reasons. Would not the figure 3,412 (or should it be 3,414?), which is the energy to the busbars, be near enough for all practical purposes?

Bradford. T. H. CARR.

ECONOMIC SURVEY 1950

IN the course of the Economic Survey for 1950 published as a White Paper this week (H.M. Stationery Office, one shilling) it is stated that although it did not prove possible to achieve the addition of 1,000 MW of new generating capacity that was forecast in the last survey, the capacity of new turbo-alternators installed during 1949 amounted to 826 MW, the highest figure ever reached in this country. Mainly owing to the different rates of progress in the several industries concerned in the supply of the equipment to the British Electricity Authority, the actual new capacity commissioned was 703 MW.

The amount of new generating capacity expected to be commissioned in 1950 should exceed the growth of demand so that if other factors are unchanged further improvement may be expected.

Expenditure during 1950 will be £102 million. This is £2.1 million less than for 1949 and is due to the decrease in the programme of distribution from £40 to £35 million and a reduction in expenditure on maintenance and repairs from £10.6 to £8 million. The total expenditure on generation will be £54 million an increase of £1.5 million over 1949 while expenditure on main transmission remains steady at £5 million. The increase in expenditure on generation will not yield sufficient capacity to close the gap between available capacity and peak demand as quickly as was hoped last year, and if demand continues to grow as rapidly as in the past there is likely to be a deficit of capacity in relation to the winter peak load for several years.

Dealing with the engineering industries, which include mechanical and electrical engineering and electrical goods, the survey states that about two-fifths of the exports of manufactured goods are made by these industries which are, therefore, expected to contribute substantially towards the higher level of exports needed in 1950. The demand for mechanical and electrical capital goods for export should be strong and the main danger is that the pressure of orders from the home market may prevent industry taking full advantage of the dollar markets.

The capacity for making consumer goods in the engineering industry is ample for a substantial increase in exports without noticeably affecting supplies to the home market and exporters should find fewer difficulties in selling abroad as a result of the steps taken towards a general freeing of European trade and of devaluation. In order to achieve the overall level of exports needed to balance our payments it is intended that supplies to the home market of capital goods should be slightly less in 1950 so that the difference, and any increase in output, can be exported.

RECENT INTRODUCTIONS

NOTES ON NEW ELECTRICAL AND ALLIED PROJECTS

Dielectric Heating Oven

A DIELECTRIC heating oven has been designed by the GENERAL ELECTRIC CO., LTD., for use with a 5 kW h.f. generator, making a self-contained and versatile equipment. The unit is primarily intended for the pre-heating of thick plastic pellets or rubber preforms, but it can be used for many other purposes.

A feature of the oven is the use of large electrodes (24in by 18in) which can be opened up to 6in apart by means of a hand-wheel control. This control may be used when the set is in operation and an electrode position indicator allows quick and accurate adjustments to be made.

The lower (earthed) electrode is carried on a drawer mounted at a convenient working height to facilitate loading, unloading and cleaning. A safety device prevents operation of the generator unless the drawer is closed, and in this position the electrode assembly is completely screened.

A variable matching inductance compensates for variations in electrical characteristics between different charges. In many cases a change of application will only necessitate adjustments to electrode spacing and the load control but the addition of the matching inductance enables a much wider range of applications to be undertaken.

The oven carries h.v. "Start" and "Stop" buttons, a red signal light to indicate when the equipment is in operation, and an output meter marked to show the maximum permissible loading. The unit is of robust sheet-steel construction mounted on castors and is finished in grey enamel.

G.E.C. high-frequency dielectric heating oven

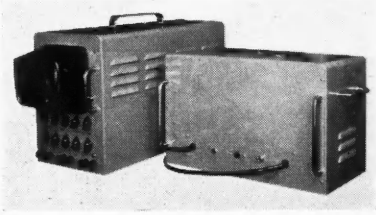
Miniature Bells and Buzzers

Miniature versions of the "Majobell" and "Majobuzzer" are now available from V. & E. FRIEDLAND, LTD., Lower Hays Mill, Cheshire. The "Minibell" is available in two types—"B" for use with a 3-4½ battery or 3-5-8 V transformer, and "L," which does not interfere with radio or television, for use with transformer only. The bell is 1½in in diameter. For a.c./d.c. the cost is 3s 6d, for a.c. only 3s 3d. The corresponding "Minibuzzers" cost 2s 11d and 2s 9d respectively.

Low-Speed Oscilloscope

An instrument for observing and comparing slow wave forms of frequency as low as 0.1 c/s is now available from A. E. CAWKELL, 7, Victoria Arcade, The Broadway, Southall, Middlesex. It can also be used like a conventional oscilloscope, although the time base frequency normally extends up to 50 c/s only. Two beams are available which may be moved with respect to one another, along any axis, and altered in amplitude and phase so as to be superimposed one upon the other.

Using a 6in long persistence cathode ray



Oscilloscope for comparing slow wave forms

tube, the unit incorporates two separate d.c. amplifiers, the outputs of which are electronically switched to provide two beams. A linear time base is included with automatic synchronization of range from 0.25 to 50 c/s. The time base (X) amplifier is also electronically switched, enabling the beams to be independently shifted in the X direction. The instrument is housed in two grey-enamelled steel cases for the power supplies and the oscilloscope.

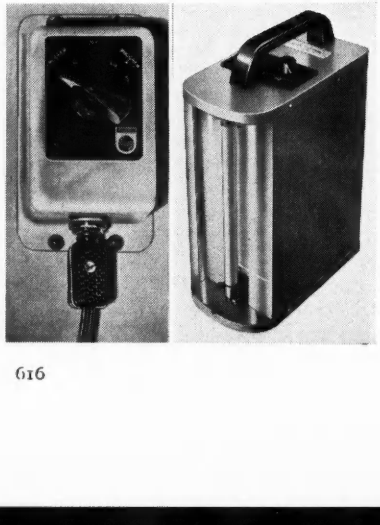
Redesigned Washing Machine

The HOTPOINT ELECTRIC APPLIANCE CO., LTD., Crown House, Aldwych, W.C.2, has redesigned its washing machine. The new model CF incorporates a push-button motor starting switch with a thermal safety device which will, on a.c. circuits, protect the motor against overload. An improved nameplate and chromium plated escutcheon plates enhance the appearance. The price is £49 15s (purchase tax in this country £12 18s 8d) or without pump £45 (purchase tax £11 14s). A table top which is available costs 30s (purchase tax 7s 10d).

Hospital Radio

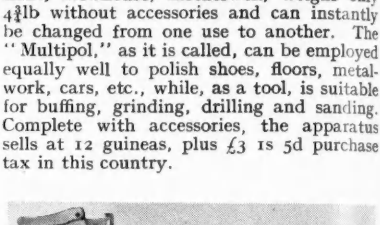
A programme switch, which has just been placed on the market by PHILIPS ELECTRICAL, LTD., Century House, Shaftesbury Avenue, London, W.C.2, enables hospital patients who are provided with "Pillotone" under-pillow speakers, or headphones, to choose between two or three main programmes at either high or low volume. This control switch is designed for mounting on the wall near the bed so that it can be quite simply operated by the patient. An "off" position is included so that the patient can switch off the programme without disconnecting the "Pillotone" unit or headphone.

Philips programme control, and (right) Process Control Gear fluorescent handlamp



Multi-Purpose Apparatus

A combined polisher, food mixer, pot scourer and bench tool made by VACTRIC, LTD., Newhouse, Motherwell, weighs only 4¾lb without accessories and can instantly be changed from one use to another. The "Multipol," as it is called, can be employed equally well to polish shoes, floors, metalwork, cars, etc., while, as a tool, is suitable for buffing, grinding, drilling and sanding. Complete with accessories, the apparatus sells at 12 guineas, plus £3 1s 5d purchase tax in this country.



Vactric "Multipol" many-purpose apparatus

Flush Switch Assembly

The "Tenby Pilot" 5-A "Frigate" flush switch assembly, made by S. O. BOWKER, LTD., Birmingham, 1, has many labour-saving features. It is of very robust construction and is housed in a plaster-depth box. Special easy wiring terminals reduce the time necessary for installation. The box is a heavy moulding with breakaway cable entries. At present this accessory is available in one- and two-gang, the latter either for horizontal or vertical fixing.

Fluorescent Handlamp

A battery-operated fluorescent handlamp providing a source of wide-angle illumination, has just been placed on the market under the trade name "Handilamp" by PROCESS CONTROL GEAR, LTD., 56, Victoria Street, St. Albans. The lamp weighs only 8¼ lb complete with two series-connected 45 V batteries, and incorporates a 9in 6 W fluorescent tube. For normal purposes the batteries have a life of about 10 hours, but, if required, a similar lamp is available for operation from 200/250 V mains. This model weighs 4¾lb and is supplied complete with four yards of flexible cable.

The company is also making a room thermostat, type R, which is housed in an attractive moulded casing, is calibrated from 48 to 72 deg F, and is claimed to have a differential of plus or minus 0.5 deg F when conditions are suitable.

Commerce and Industry

Radio Interference Regulations
The Situation in Japan

IN the House of Commons last week Mr. Peedes asked the Postmaster-General when the regulations now being prepared by his Department to prevent the radiation of electro-magnetic energy from interfering with wireless and television reception would be published, and when they would come into force.

Mr. Ness Edwards said that the Wireless Telegraphy Act, 1949, provided that, before making such regulations, he should consult an Advisory Committee appointed from a panel nominated in accordance with the provisions of the Act. He expected the nominations to the panel to be made shortly and would then appoint the Advisory Committee. Naturally some time was bound to elapse after the Advisory Committee was appointed before any regulations could be made.

Building Materials Exports

There has been a considerable expansion in Britain's exports of building materials. Last year, when world markets were again competitive, the twelve largest exporting industries of building materials sold abroad over six times their figure for 1938. The total value of these exports in 1949 was £28,879,473 as against £28,377,664 in 1948, £13,038,882 in 1946 and £4,664,247 in 1938. In announcing these figures, the Ministry of Works says that though they reflect to some extent the general increase in world prices, they represent a very large increase in the volume of business secured. Included in the twelve industries are electricity meters, the exports of which in 1949 were valued at £1,488,290, as compared with £2,208,171 for 1948, £533,496 for 1946 and £189,496 for 1938, and electric cookers and cooking appliances, exports of which were £1,102,750 in value, as against £1,772,367 in 1948, £410,359 in 1946 and £199,201 in 1938.

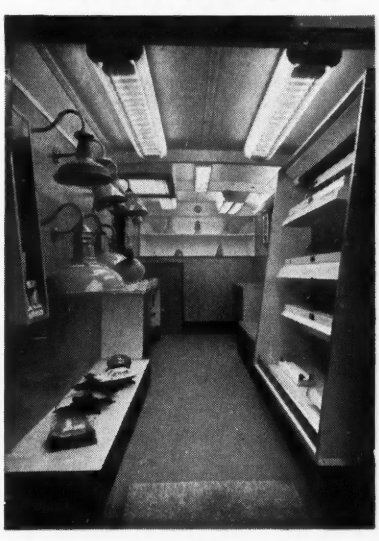
Distribution of Industry

Last week the President of the Board of Trade (Mr. Harold Wilson) presented the Distribution of Industry Bill, which extends the Government's powers to acquire land, carry out works and provide financial assistance to encourage the establishment of industrial undertakings in "development areas." Clause 1 enables the Board of Trade to acquire existing industrial premises which need no substantial adaptation—compulsorily if they are not in substantial use or likely to be in use within a reasonable period. Clause 2 empowers the Board to carry out work on land which it does not itself hold. Clause 3 provides that the Board may make grants, with the consent of the Treasury, in exceptional circumstances in respect of expenditure or loss arising in connection with the establishment or transfer of undertakings and to make grants or loans for housing in development areas. Clause 5 enables the Minister of Labour to help meet the cost of transferring key workers.

Lighting Fittings Mobile Showroom

In the last few years Crompton Parkinson, Ltd., have been extending and redesigning their showrooms throughout the country for demonstrating the comprehensive range of lighting fittings they have

The interior of the new Crompton Parkinson mobile showroom for lighting fittings



Part of the new showrooms recently opened by the S.E.B. in Swindon

developed. To provide similar facilities in areas where it is not always convenient to visit a showroom they now have a mobile showroom.

The mobile showroom has a special van body on a 5-ton Austin long-wheelbase chassis with 25in Baico extension. It has been arranged to contain more than thirty different types of lighting fittings. One of the latest trends in lighting shown is the Crompton "Louvalite" screening for fluorescent lamps. Other examples include ceiling types with decorative panels of translucent material, and in some cases incorporating lattice louvres. There are also fluorescent fittings for shop window and display lighting, and a demonstration of the method of recess lighting for mirrors. The new Crompton display spot-light reflector fitting with colour screens is also being shown. A variety of types of reflectors for industrial lighting either by fluorescent or filament lamps are available for inspection.

To provide for different supply voltages a "Variac" transformer control is installed. For direct connection to an external 230 V a.c. supply a changeover switch is fitted. The interior of the showroom is finished in sycamore and mahogany veneer, with seats and shelving covered in brown plastic material made by the company.

Model Railway Exhibition

The Model Railway Exhibition, 1950, organized by the Model Railway Club, Ltd., will be held at the Central Hall, Westminster, from 11th to 15th April.

New Swindon Showrooms

On 15th March the Southern Electricity Board opened new showrooms at 20, Fleet Street, Swindon. The ceremony was performed by Councillor F. E. Akers, Mayor of Swindon, and was preceded by a luncheon at the Great Western Hotel, at which Mr. H. Nimmo, chairman of the Board, in referring to rural supplies, said that the Board connected more villages and farms in the first year of its existence than any other Area. Other speakers were Col. H. G. Fraser, No. 2 Sub-Area manager, and Mr. W. J. Moran, chairman of the Swindon Branch of the Electrical Contractors' Association.

The new showrooms include, in addition to a well-arranged general showroom, a kitchen in which regular demonstrations will be given.

Trolley-bus Equipment for Overseas

In a few weeks the first of fifty trolley-buses fitted with B.T.H. electrical equipment will go into service in Perth, Australia. These will be followed by thirty trolley-buses in Adelaide, and thirty in Brisbane, all with B.T.H. traction equipment. A second repeat order for traction equipment has been received from Finland, bringing the number of B.T.H. trolley-bus equipments supplied or on order for that country up to thirty-five. The chassis and bodies are constructed in Finland.

Japanese Economic Recovery

The good progress which Japan has made with the financial, economic and technical assistance of America, towards economic recovery, was referred to by Air Vice-Marshal C. A. Bouchier, at a Press conference arranged by the Federation of British Industries in London last week. Sir William Palmer, chairman of the Japanese Panel of the F.B.I. Overseas Policy Committee, who introduced the speaker, mentioned that Air Vice-Marshal Bouchier was, until 1948, deputy commander-in-chief of the British Commonwealth Forces in Japan, and was fully acquainted with the economic conditions in that country. In a survey of the progress of Japan's economic recovery, the Air Vice-Marshal reminded his listeners that only 16 per cent of her land was fit for cultivation, and with a population of

83 million, which, it was estimated, would increase to about 107 million by 1970, her economic problems were similar to those experienced in Great Britain.

She was essentially a manufacturing nation, having to import almost all her raw materials. In order to survive she must sell her manufactured goods in the markets of the world so as to obtain foreign currencies with which to pay for her essential imports of raw materials and food.

If, said the speaker, Japan was to stand on her own feet she would need to treble her exports. Her threat to British trade, however, was likely to be felt in goods of lower grades, and he emphasized the advantage to British industry of maintaining its reputation for the quality of its products. In spite of increased production Japan still had to sell her goods in the shrinking markets of the world, and in these markets her exports would tend to meet tough competition. Meanwhile, Japanese unsold stockpiles were mounting (estimated at £45-50 million). Even so, it was reasonable to assume that Japan's foreign trade would continue to expand.

Mr. H. D. B. Wood, secretary of the South Western Electricity Board, addressing the Taunton publicity conference. With him (left to right) are: Mr. R. W. Steel (chief commercial officer), Mr. L. V. Turner (Taunton Sub-Area manager), Mr. D. Atkins (Mather and Crowther, Ltd.), and Mr. E. C. Willis (Bristol Sub-Area manager)

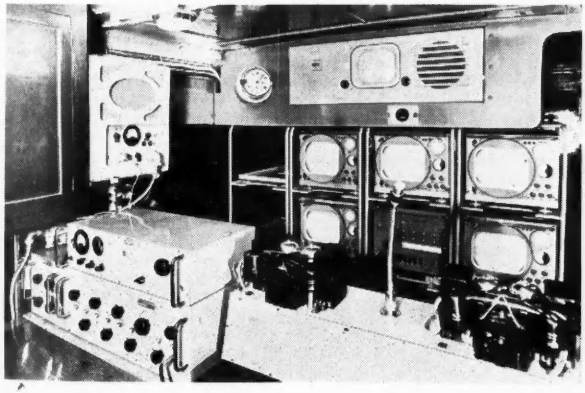
South Western Publicity Conferences

District officers and commercial staff of the South Western Electricity Board attended two publicity conferences held recently at Taunton and Torquay. The main purpose of these conferences was to enable local staffs to comment on and criticize the provisional advertising programme for 1950-51 prepared by head office in collaboration with the Board's advertising consultants, Mather and Crowther, Ltd. Hitherto a great deal of the Board's publicity has been concerned with information or prestige advertising, but the 1950-51 advertising will be directed almost exclusively at sales promotion. As a result of suggestions made during interesting and lively discussions at the conferences, a number of modifications are now being made to the original designs.

Mobile Television Control Room

The latest major item of equipment to be supplied to the B.B.C. by Emitron Television, Ltd., is a mobile central control room for use on television outside broadcasts where more than three cameras are employed. It provides overall control of up to four mobile outside broadcast units each of which is normally equipped with three camera channels, thus providing for the first time, direct control of all cameras by the senior producer on the site.

The selected picture and accompanying sound signals from each unit are



Interior of the Emitron mobile control room as seen from the senior producer's desk

fed to the central control van, where the pictures are displayed on monitor screens. The producer then selects the required picture for transmission from Alexandra Palace. Provision is made for transmitting the selected picture and sound signals to the television station proper by land-lines or radio link.

Lead Rationing Suspended

It is announced by the Ministry of Supply that as from to-morrow (1st April) the lead allocation system will be suspended and users will be able to obtain supplies without restriction upon quantities in a given period.

Zinc Price Raised

A further increase of £2 a ton in the price of zinc was made as from 28th March making the price £89 10s a ton.

Trade Announcements

The **Truvox Engineering Co., Ltd.,** of Wembley, Middlesex, has opened a service department for its "Juno" domestic and "Oco" industrial floor polishers at 328, The Broadway, Station Road, Harrow (telephone Harrow 4455). The telephone number of the appliance sales office has been changed to Harrow 4455.

As from 1st April all sales and service for "Unionmelt" automatic arc welding equipment in the United Kingdom will be handled by the **Quasi-Arc Co., Ltd.,** and inquiries should be addressed to the company at Bilston, Staffs (telephone Bilston 41905).

The new address of **Acheson Colloids, Ltd.,** is 18-19, Pall Mall, London, S.W.1 (telephone: Whitehall 2034).

Ekco-Ensign Electric, Ltd., announces that, as from 13th March, Mr. M. C. Hughes will represent the company as illuminating engineer in the West of England. Mr. Hughes, who was previously with the Ekco-Ensign Illuminating Engineering Department at their London office in Vigo Street, will operate from Hilltop Cottage, Bulley, Churcham, Gloucester (Telephone: Tibberton, Glos, 79).

Star Supplies (Dom. & Ind.), Ltd., 10, Dolefield, Wood Street, Manchester, 3, has appointed Mr. J. W. J. Stothard to represent it in Lancashire and Cheshire.

Electropower Gears, Ltd., has appointed Warton Mitchell, Ltd., 16-18, Russell Street, Manchester (telephone: Ardwick 2672) as its sole representative for the northern counties.

New stores have been acquired by **Santon, Ltd.,** adjacent to its London office and showrooms at 18, Lowndes Street, Lowndes Square, S.W.1 (telephone: Sloane 2158), and the company can now deliver from its stocks in London all types of its domestic immersion and storage heaters, water boilers, rotary switches, control units, etc.

The telephone number of the Edinburgh branch of **British Insulated Callender's Cables, Ltd.,** is now Central 6786-7.

The telephone number of the head office of the **Telegraph Construction & Maintenance Co., Ltd.,** and its subsidiary companies has been changed to London Wall 7104.

Radio Component Manufacturers

The seventeenth annual report presented at last Wednesday's meeting of the Radio and Electronic Component Manufacturers' Federation shows that the production of domestic radio sets declined by about 20 per cent in 1949 but the total was maintained by a rise of 100 per cent in the production of television receivers. A marked feature of the past year was a steady reduction in prices which, however, was arrested by devaluation.

A large section of the report is devoted to a survey of the export position. It is said that the export peak was reached in 1947 and there has since been a slow decline, although the exports of transmitting and "heavy" apparatus may not yet have reached their maximum. About 46 per cent of all exports went to British Commonwealth countries.

The Federation has continued its activities in the field of standardization.

Outdoor Advertising Agreement

Following negotiations between the outdoor advertising industry associations and the Doncaster and Leyton Corporations, the Corporations have undertaken to amend clauses in their Private Bills now before Parliament so as to exclude all reference to advertisements which are within the Control of Advertisement Regulations. In view of these undertakings the joint petitions of the British Poster Advertising Association, the Electrical Sign Manufacturers' Association and the Master Sign Makers' Association have been withdrawn.

Swiss Electrical Regulations

Under a recent decree of the Swiss Federal Authorities, a wide range of electrical equipment will, some time during the current year, become subject to compulsory testing and the application of a safety mark. The list of equipment subject to compulsory test is to be drawn up by the Swiss Association of Electricians, which will also prepare detailed regulations for carry-

ing out the new provisions. These regulations will apply equally to goods imported for use in Switzerland. Lists will be maintained of the equipment bearing the safety mark and showing the manufacturer's name and factory mark. In the case of foreign equipment, the name of the manufacturer or of the responsible Swiss distributor, must be shown. The date of operation of these safety measures will be fixed by the Swiss Department of Ports and Railways when it has approved the regulations to be drawn up by the Swiss Association of Electricians. After that date it will be illegal for equipment not bearing the safety mark to be offered for sale unless special permission has been obtained from the Swiss authorities.

B.I.F. Export Gala

The Institute of Export is organizing a B.I.F. Export Gala which will be held at the Empress Hall, Earls Court, on 12th May. The Institute is receiving the full collaboration of the British Industries Fair authorities, and the Gala has been conceived as a means of providing exhibitors and buyers (especially overseas buyers) with an opportunity of meeting informally for an evening of dancing and cabaret entertainment, and it is hoped that Birmingham exhibitors as well as those at Olympia and Earls Court will participate. The Empress Hall will accommodate 6,000 visitors, and three well-known broadcasting bands and many artistes and choirs have been engaged. Tickets for the Gala (30s each, inclusive of running buffet refreshments) may be reserved on application to Mr. A. J. Townsend, general secretary of the Institute of Export, Holland House, 140, Cromwell Road, London, S.W.7, from whom full particulars of the gala can be obtained. There will also be a limited number of boxes, to seat ten persons, at £25 each.

Illumination Design Course

A daytime illumination design course will be held at the E.L.M.A. Lighting Service Bureau, 2, Savoy Hill, London, W.C.2, from 24th to 28th April.

MECHANICAL HANDLING EXHIBITION

London Show to be World's Largest

THE full programme is announced for the Convention which is to be held at Olympia in London (6th to 17th June) concurrently with the second Mechanical Handling Exhibition. This display of labour-aiding equipment on a floor area exceeding 200,000 sq ft will be more than twice as large as the first very successful exhibition in 1948.

Methods of introducing new equipment, of overcoming workers' prejudice and of adjusting wages rates are of major importance in extending the use of mechanical aids and will be discussed jointly for the first time by manufacturers and users of the equipment as well as trade union representatives.

The Anglo-American Council on Productivity, under whose auspices a mechanical aids team from Great Britain recently visited the U.S.A., has accepted an invitation to participate in the Convention and the team itself will organize a discussion of its report.

Authoritative papers to be discussed at other sessions of the Convention cover railway practice, production engineering, time and motion studies, overhead chain conveyors in factories, aerial ropeways, jib cranes at docks, mobile rail-type cranes and derricks for contractors, electrical equipment on cranes, control of electric power and sequence flow, screens and feeders, power and fork trucks, goods and package handling, storing and reclaiming materials, elevators and skip hoists.

The Exhibition and Convention, which are supported by the leading associations in the industry, are being organized by *Mechanical Handling*, Associated Iliffe Press, Dorset House, Stamford Street, London, S.E.1.

New Grinding Regulations

IN April, 1949, the Minister of Labour and National Service published two sets of draft regulations for the grinding of metals and of cutlery and edge tools. Some objections were made to the regulations for the grinding of metals, and the Minister has now published a revised draft of those regulations which takes account of the objections. In the case of grinding of cutlery and edge tools, no such difficulties arose, and accordingly the Minister has now made those regulations in the form of the draft published last year. The revised "Draft Grinding of Metals (Miscellaneous Industries) (Amendment) Special Regulations" is obtainable from H.M. Stationery Office, price 1d, and the "Grinding of Cutlery and Edge Tools (Amendment) Special Regulations, 1950" (S.I. 1950, No. 370), price 2d.

MARCONI JUBILEE

Development of Marine Wireless

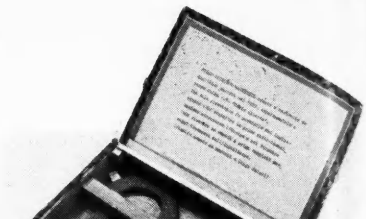
IN celebrating its jubilee this year, the Marconi International Marine Communication Co., Ltd., also marks the fiftieth anniversary of marine wireless and pays a fitting tribute to Guglielmo Marconi. Apart from various social functions and official visits to the works and other premises of the company, these celebrations, which commenced last week and will continue until 6th April, also include an interesting exhibition of equipment at the Baltic Exchange in London.

A banquet was held at the Dorchester, Park Lane, London, on Tuesday, 21st March, the distinguished company including many men well known in the electrical and communications industries.

Sir George Nelson, chairman of the company, who presided, said that it was an international occasion, and he was grateful to the ambassadors, chargés d'affaires and official representatives of so many nations and the leaders of the shipping industry for their presence. The origin of the achievements over the past fifty years for the safety of ships at sea was the genius of one man (the late Guglielmo Marconi). He brought his primitive apparatus to England where he obtained the support of Sir William Preece, Engineer-in-Chief of the G.P.O. at that time. That equipment was present at the banquet and, as a tribute to Guglielmo Marconi, Sir George asked the present Marchese to operate it as his father did fifty years ago. Marconi's first message across the water was sent in 1897, and after that event the Marconi International Marine Communication Co., Ltd., was formed to develop Marconi's discoveries. Sir George mentioned that to-day there were 12,000 merchant ships equipped with Marconi apparatus and over 2,000 Marconi radio officers serving in British ships alone.

The toast of the guests was replied to by Mr. Alfred Barnes, Minister of Transport, in a very well-informed speech and Sir W. Guy Ropner, president of the Chamber of Shipping of the United Kingdom. During the evening a message of greeting was received through a loudspeaker from the captain of the *Mauretania* while outward bound for New York.

The exhibition, which was opened last Friday by Sir George Nelson and continues until 4th April, reviews the development of marine wireless since the company was formed in April, 1900. The exhibits are displayed in wireless cabins typical of those of 1900, 1910 and the following decades up to the present time. Modern radio aids to navigation such as radar and the echometer find their rightful place in the chart room. Exhibits of historical interest are on view in a separate showcase. Among these are the first valve receiver ever made, produced by the Marconi Co. in 1904, and employing the Fleming diode; the first magnetic detector made by Marconi and used on board the Italian cruiser *Carlo Alberto* in 1902; and an early experimental spark transmitter.



Marconi magnetic detector used experimentally in 1902 in the Italian cruiser *Carlo Alberto*

Another interesting item shown is an accurate model of the company's works and head office at Chelmsford, found in 1945 in a Luftwaffe building at Quedlingburg in Germany.

Fire-extinguishing Apparatus

THE suitability of different portable fire-extinguishing appliances for various kinds of fires is dealt with in a booklet on "Portable Fire-extinguishing Appliances," published by the Fire Offices Committee of the Fire Protection Association, 84, Queen Street, London, E.C.4. It is emphasized that portable appliances should only be considered as first-aid appliances for use on fires in their early stages. Whilst they can be used by untrained personnel, it is desirable that those likely to use them should be familiar with the method of operation of the particular type installed.

ELECTRICITY SUPPLY

Generating Plant Extensions
Grit Emission at Kirkstall

THE British Electricity Authority has received the consent of the Minister of Fuel and Power to the establishment of a new power station at Crimpsall, Doncaster. The first section covered by the consent will comprise two 30,000 kW turbo-alternator sets and four 180,000 lb/hr boilers. When fully built, the station will have an installed capacity of 120,000 kW.

Consent has also been received to the extension of the Portobello power station, Edinburgh, by the installation of a 60,000 kW turbo-alternator and a 540,000 lb/hr boiler. This will raise the installed capacity of the station to 192,500 kW.

Power Station Grit

Lieutenant-Colonel Kaberry asked the Minister of Fuel and Power last week what further progress he could report to remedy the public nuisance created by the outpouring of grit and dirt from the chimneys of the Kirkstall power station at Leeds.

Mr. Noel-Baker said he was informed that the British Electricity Authority was engaged in making alterations to the Kirkstall station which should ensure that the station would be no longer open to criticism on the score of grit emission. In particular a new chimney should be completed this year and new electrostatic precipitators and ash handling plant next year.

Illuminated Fountain

A colourful feature of Brighton's illuminations before the war was the "Mazda" electric fountain on permanent loan to the Corporation from the British Thomson-Houston Co., Ltd. The fountain, set up in 1931, became unserviceable while out of use during the war, but now, with the assistance of the B.T.H. Co., it has been completely restored and will be officially switched on next Wednesday.

No Direct Labour Installations

On the recommendation of the surveyor (Mr. V. J. Hunter) the Houghton-le-Spring (Co. Durham) U.D.C. has decided not to carry out electrical installations in Council houses by direct labour. Mr. Hunter stated that he had carefully examined complaints regarding switches, etc., installed by private contractors, and there was no evidence that these had been of an inferior kind. He contended that it would be uneconomic to maintain a semi-permanent staff of electricians to carry out work by direct labour.

Elan Valley Waterworks Plant

The South Wales Electricity Board has recently completed negotiations for taking a small bulk supply of electricity from the Birmingham Corporation's water undertaking at Elan Valley. The Corporation at present provides electricity for purposes connected with the waterworks from two small generating sets at Caban-Coch Dam. It has been provisionally agreed that the Corporation should install two sets of greater generating capacity than those at present in use, and that after meeting the requirements of the waterworks undertaking the surplus energy generated (estimated at 1.4 million kWh per annum) should be made available to the Board for distribution.

Large Newcastle Scheme

Newcastle-on-Tyne City Council intends to carry out a £115,000 scheme for installing electric lighting in place of gas in 4,650 houses and flats belonging to the Corporation. During recent years there has been an insistent and growing demand for electric lighting and over 1,000 tenants have had electricity installed, the cost being subsequently refunded to them by the Council. It is proposed to carry out the work over a period of five years. For the first year the cost will be £15,825.

Padiham Transformer

A 15 MVA transformer has been installed on the North Western Electricity Board's circuits at Padiham power station. This steps up from the 11 kV busbars to feed a 33 kV line to Rochdale and replaces an old three-phase bank of transformers totalling 12.75 MVA. In-phase and quadrature boost are incorporated in the transformer which enables the line to Rochdale to be fully

loaded, thus giving an additional 5 MW capacity in the circuits to Rochdale, which, in addition to the Padiham-Rochdale circuit, include five circuits from Kearsley power station.

Twelve Years' Wait

Houses built by the Sunderland Rural District Council at Ford Oval, Hylton, twelve years ago which were wired for electricity but were never connected to the supply, are to receive electricity shortly. First, the Council is to carry out a test of all the electrical fittings in the houses.

Rural Supplies

Borrowdale Parish Council has been informed by the North Western Electricity Board that there is no immediate prospect of electricity being supplied to Borrowdale valley. The Council has enlisted the support of the Cumberland County Council and Mr. F. Peart, the local M.P., is to try to speed up matters.

Southend Illuminations

After considering objections from Ratepayers' Associations on the grounds of nuisance caused by coach parties, Southend-on-Sea Corporation has decided to proceed with a comprehensive scheme of illuminations next autumn. Vacant land is to be levelled to provide parking accommodation for coaches.

School Installations

Durham County Education Committee is seeking approval in principle from the Ministry of Education to a scheme for installing electricity in more than 40 schools at present served by gas.

Pumping Plant

It is proposed to replace the old pumping equipment at the Metropolitan Water Board's New River Head pumping station by two modern electrically driven centrifugal pumping sets, working on purchased electric power. The estimated cost of the proposed works, inclusive of control gear, switchgear, cables, etc., is £10,500, but there will be a saving of about £3,000 per annum in running costs.

Gibraltar Change-over

The City Council of Gibraltar is changing over its 110 V, 76 c/s system to 240 V, 50 c/s.

Lighting Schemes

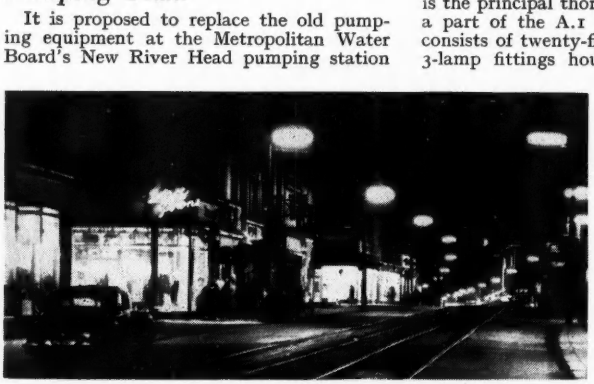
Rutherglen Town Council has been informed by the South West Scotland Electricity Board that a scheme of conversion of the street lighting from gas to electricity has been completed, and that the proposals will be submitted to the Town Council soon. When Rutherglen itself considered introducing electric street lighting the estimated cost was £70,000.

Approval has been given by Lanark County Council for a relighting scheme for Milton, Abbeygreen, and New Trows Road at an estimated cost of £3,700. The question of relighting the side streets is to be considered later. Fifty-eight 65 W sodium lamps are to be installed.

Horbury Urban District Council is preparing a scheme for converting from gas to mercury electric-discharge lighting two miles of the main Wakefield-Huddersfield road which lie within the town.

Hinckley U.D.C. is considering the provision of electric lighting along trunk road A.47 through the town. The cost would be £8,010 and the Ministry of Transport is to be approached regarding a grant.

A scheme of B.T.H. fluorescent lighting has been put into operation in Northumberland Street, Newcastle-upon-Tyne. This is the principal thoroughfare in the city and a part of the A.1 road. The installation consists of twenty-five "Mazda" fluorescent 3-lamp fittings housing 5ft 80 W lamps. The units are mounted opposite each other on tram standards at 110ft intervals. The Corporation engineer designed the installation and lighting engineers from the B.T.H. Newcastle office advised in regard to siting.



"Mazda" fluorescent lighting in Northumberland Street, Newcastle-upon-Tyne

Industry and the House

New Ministers

By F. J. ERROLL, M.A., A.M.I.E.E., M.P.

NOWHERE is the change in the voting of the country at the General Election more obvious than in the House of Commons itself. The Labour Party has lost a number of its younger and more active Members. These have been replaced by new Conservative M.P.s, many of whom have fought several years for their seats and who are now determined to make the most of their Parliamentary opportunities.

The result is a keen, lively Opposition confronting a Government of men who have mostly held appointments in Mr. Attlee's previous Ministry, and supported by a body of aging Labour supporters. The average age of the Government has increased, while that of the Opposition is lower.

Consequently question time and debate are more lively and Ministers have to face a stronger barrage of Opposition speeches and supplementaries. In addition to some former Conservative Members who have returned, there are a number of new Members with considerable experience of trade and industrial affairs. One such is Mr. Ian Orr-Ewing, the new M.P. for Weston-super-Mare, who is connected with the radio and television industry and has already made several useful contributions to debates.

Fuel Questions

Readers who follow the affairs of our nationalized industries will have noticed that Mr. Hugh Gaitskell has been moved to the Treasury, and Mr. Noel-Baker, formerly Secretary of State for Commonwealth Relations, has taken his place. It cannot be easy to take over responsibility for electricity, coal and gas, and a few days later be called upon to answer detailed questions on all three industries. Nevertheless, that is what Parliament expects, and experienced Minister that he is, it cannot be said that Mr. Noel-Baker came out of his first question period very well. New opposition Members, in particular, were quick to take advantage of his weakness.

Mr. Boyd-Carpenter harassed the Minister on variations in hire charges between one area and another. In reply, the Minister said he hoped there would be a rapid advance towards the standardization of prices, but for the present there must be some variation. In this case, pursued Mr. Boyd-Carpenter, the "variation" amounted to 300 per cent. The Minister said that the consumer was hiring a kettle, a cooker and a heater for only 28s a year, but M.P.s who had been following the exchange closely echoed "Per quarter." The Minister was glad when the Speaker called the next question.

Post Office Affairs

There has been a change, too, at the Post Office where Mr. Ness Edwards, formerly Parliamentary Secretary to the Ministry of Labour, has taken over from Mr. Wilfred Paling. He has fared somewhat better at question time, but he has had the added ordeal of presenting the biennial Post Office Money Bill within three weeks of the assembling of the new Parliament. This authorizes the Post Office to embark on additional capital expenditure and this time the bulk of the money to be spent will go on additional telephone facilities. Normally the debate on the Bill is a narrow one and limited strictly to capital expenditure. But the new Minister chose to range over the whole field of Post Office activity and thus made a wider debate possible. The Opposition was quick to use this opportunity to air grievances about the postal services, and a debate which was only expected to last two hours spilled over from one Friday into the following week.

The Postmaster-General claimed that

the greatly increased demand for telephones was due to the improved economic position of the country. Telephone staffs were installing lines and instruments at an unprecedented rate. He regretted the waiting lists, and hoped that more people would share lines. Finally, he made an encouraging announcement about the television transmitter programme which, it appears, has not been unduly affected by capital cuts consequent upon devaluation.

His deputy, the Assistant Postmaster-General, an unchanged appointment, replied a week later to the debate. He claimed that there was a constantly growing demand for more telephones. People were becoming more "telephone conscious" which was in itself a sign of a "buoyant economy." One in three of the telephones in this country had been provided since 1945 which, Mr. Hobson added, was no mean accomplishment having regard to the shortage of raw materials.

In regard to the television service the Assistant Postmaster-General was only prepared to say that an area of fifty miles radius from the transmitter could be covered. Stations will be linked by radio and only in a very few cases by co-axial cable. Generally the House seemed satisfied with the television transmitter programme.

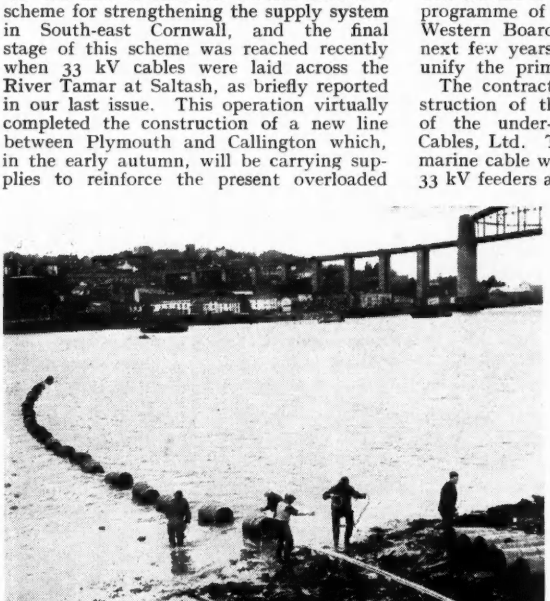
Cable-laying Across the Tamar

South Western Board's 33 kV System Reinforcement

THE South Western Electricity Board has had in hand for several months a scheme for strengthening the supply system in South-east Cornwall, and the final stage of this scheme was reached recently when 33 kV cables were laid across the River Tamar at Saltash, as briefly reported in our last issue. This operation virtually completed the construction of a new line between Plymouth and Callington which, in the early autumn, will be carrying supplies to reinforce the present overloaded 33 kV ring serving South-east Cornwall. The scheme is only part of the considerable programme of extensions which the South Western Board plans to carry out in the next few years in order to strengthen and unify the primary network.

The contractors responsible for the construction of the new line and the laying of the under-water cables were Enfield Cables, Ltd. Three lengths of Enfield submarine cable were laid across the river, two 33 kV feeders about ten yards apart (one to act as stand-by) and a pilot cable. The two feeders are protected with No. 8 s.w.g. double wire armour and each weighs 17½ tons. They were sunk into six fathoms at low water, being connected at the shore ends to underground systems already laid. The work was carried out under the direction of Mr. G. B. Russell, the area engineer of the company.

Hampered by the fast flowing current of the river, each cable took a day to secure. Empty steel drums at intervals



Laying 33 kV submarine cables across the Tamar

of three yards supported the cable as it was floated across. In all, 180 drums were used, with a special quick-release device to cast off the drums as soon as the cable was in its final position. The drums were then collected by waiting boats. To reduce friction the company designed and manufactured special aluminium cable rollers for this installation.

Valuable co-operation was given by the Admiralty who provided charts and made picket boats available to keep the area clear of shipping while the cable-laying was taking place.

GRID TARIFFS

Introduction of New Bulk Supply Rates

NEW charges for bulk supplies of electricity to the Area Boards by the British Electricity Authority come into force on 1st April. The interim tariffs have hitherto incorporated percentage surcharges or discounts. These adjustments, intended to lessen the impact which would have resulted from an immediate change from previous charges to a uniform charge, have been reduced by stages with the object of instituting a national tariff. That object will be achieved by the new tariff which will be the same for all Area Boards, subject to the appropriate variations under the standard fuel cost clause.

The interim tariffs were necessarily fixed before full information was available about the allocation of assets between the Authority and the Area Boards, the capital and other annual charges to be borne by them and the incidence of other costs and charges consequent upon the transfer of undertakings. The Authority's trading with the Area Boards resulted in a small deficit in 1948-49.

New generating plant and transmission equipment are being provided at increased cost, with a resultant increase in annual capital charges which can only be partially offset by the resulting economies in operating costs. Moreover, operational labour costs have risen in consequence of an increase in rates of pay agreed during the current financial year. In these circumstances the Authority has found it necessary to increase the bulk supply tariff.

The additional costs are mainly in the fixed charges, but economies that have been effected in the running costs are being applied to offset partly the increase in fixed costs. The new fixed charge is increased to £3 15s/kW of maximum demand, while the running charge remains unaltered at 0.335d/kWh subject to a variation of 0.0007d for each 1d variation in the price of fuel in the respective Areas from the basic figure of 38s per ton.

The method of ascertaining the chargeable maximum demand will be similar to that used in previous years, namely, the average of (a) the m.d. between 7 a.m. and 7 p.m. on Mondays to Fridays and 7 a.m. to 12 noon on Saturdays at each separate point of supply in the year of account and (b) the corresponding maximum demands in the preceding year.

If any Area Board has a demand at night, or during a week-end, in excess of its maximum daytime demand during weekdays the excess will be charged for at the rate of one-third of the normal kilowatt charge.

The new tariff is calculated to increase the revenue of the Authority from the sale of electricity in bulk to the Area Boards by a little more than 2 per cent of the revenue from such sales in 1949-50, but the increase in charge will fall more heavily on some Area Boards than on others.

E.I.B.A. Nottingham Branch

AT a dinner of the Nottingham Branch of the Electrical Industries' Benevolent Association held recently at the Victoria Hotel, Nottingham, it was stressed that despite the existence of the National Health Service there remained a wide field for voluntary service.

Proposing the toast of the Association, Mr. E. G. Phillips, a former chairman of the branch, said it was doing a great deal of good, but not nearly enough. In 1948, 398 cases were being dealt with, 25 per cent more than the previous year, and there were 148 new cases last year. The Association was showing great interest in tuberculosis cases. For these the time-lag was anything from six to eighteen months before they could get a bed. The Association did not wait for empty beds; it spent a great deal of money putting patients into private hospitals and had saved many lives. The National Health Service had made many think there was no necessity to take an interest in this matter. That was not so.

The response was made by the principal guest, Mr. C. R. King, chairman of the East Midlands Electricity Board.

FINANCIAL SECTION

Company Notes and Stock Exchange Activities

REPORTS AND DIVIDENDS

The English Electric Co., Ltd.—The annual meeting was held on 22nd March, when Sir George Nelson (chairman), who presided, said that the turnover for 1949 was up by nearly £6 million on the 1948 figure, which was £5 million better than in 1947. Research, development and production in the fields of power generation, transmission and utilization had been substantially increased during the year.

They were playing a major part in the North of Scotland Hydro-Electric Board's project, for which a high proportion of the equipment was being built in Scotland to their designs. In the field of steam power generation, turbines of the highest steam temperatures and pressures were being built, operating with alternators equipped with hydrogen cooling. Substantial orders for home and export had been received for diesel engines. Much work had already been done in research and development of high voltage transmission switchgear and transformers, and their order book had been maintained at a satisfactory level. For transformers the orders covered units for up to 275 kV, including one for the British Electricity Authority which would inaugurate the first section of the grid at this voltage. They were also completing one of the biggest transformers ever built; this unit was for export and was for 220 kV. They continued to hold a position in the forefront of electric drives for heavy industry, and had played an important part in the development of the South African gold mining industry by equipping deep shaft winding engines with a.c. motors fitted with d.c. braking.

In the electric traction field they supplied all the electric motor and electrical control equipment for the Liverpool Street-Shenfield electrification and they also provided the electrical equipment for the first double-deck train now in service on the British Railways' Southern Region. A complete electric traction scheme for Brazil included locomotives, substation switchgear and pumpless steel bulb rectifiers for feeding the overhead traction system. The demand for their diesel-electric locomotives continued at a high level and included a considerable number of 1,700 h.p. complete locomotives for the Egyptian State Railways. Additional research, design and manufacturing facilities had enabled them to increase the volume of output of mercury-arc rectifiers for railways, electric furnaces, radio communication and power supply.

In the domestic field they had extended their range of appliances, which now included cookers, hot plates, washing machines food mixers, refrigerators and television receivers. They had established themselves in a special branch of marine turbine business, and orders had been received from the Admiralty for their designs of marine turbines for propulsion of H.M. ships. They had continued their research and development in gas turbines and several applications were in hand and making good progress.

Sir George said that in his speech last year he mentioned that their export business was practically 50 per cent of their production. This had been maintained during the past year. They had important orders for Canada and they expected to develop their business in North America, not only in heavy equipment from the English Electric Co., but also in the lighter engineering products through their Marconi Instruments factory. Sir George concluded with brief reviews of the subsidiary companies, D. Napier & Son, Ltd., Marconi's Wireless Telegraph Co., Ltd., and the Marconi International Marine Communication Co., Ltd.

Marconi's Wireless Telegraph Co., Ltd.—Presiding at the annual meeting held on 22nd March, Sir George Nelson (chairman) said that their order book had shown a marked increase and their exports had been maintained at a high level. During the year new designs of equipment had been introduced throughout their range of products. In the field of broadcasting they had produced new designs of short-wave and medium-wave high-power transmitters for which they had already received substantial orders. The B.B.C. had taken the initiative in planning a noteworthy experiment in v.h.f. broadcasting which was expected to settle the world-wide problem of the relative merits of frequency and amplitude modulation. In addition to the 25 kW frequency-modulated transmitter mentioned last year, they had delivered an amplitude modulated version of the same transmitter. Marconi television cameras which were being used by the B.B.C. had achieved some outstandingly successful

broadcasts. Marconi's would be responsible for the whole of the plant at the Holme Moss television station.

On the communications side their long-term plans for the development and marketing of v.h.f. multi-channel radio-telephone links were now becoming effective and during the year orders were received for a large number of these installations. Among certain equipment which had been developed and marketed jointly by themselves and Siemens Bros. was telephone terminal equipment for long-distance radio circuits, of which a large number had been sold. They continued to receive substantial orders for police radio systems. The radar installation for use in ships had received type approval by the Ministry of Transport and had proved successful. The X-ray factory extension of Marconi Instruments, Ltd., was completed during the year.

The Marconi International Marine Communication Co., Ltd.—In reviewing this company's activities during the past year Sir George Nelson (chairman) said that this was the company's jubilee year. The amount invested in apparatus in ships, less depreciation, at 31st December last totalled £1,579,000, being £758,000 more than at 31st December, 1947. An extraordinary meeting was being held after the annual meeting to increase the borrowing powers to an amount equal to the issued capital instead of to only 50 per cent of it as at present.

During the year they had fitted or refitted more vessels and put into service more equipment than in any previous peace-time year in their history and their order book still compared favourably with the average of the previous three years. This rate of progress could not, however, continue indefinitely, because of the working off of the backlog of shipbuilding. During the past two years they had, in collaboration with their associated and affiliated companies, created a world organization with more than 200 service depots and bases through which more than 12,000 vessels which had their equipment installed were assured of attention to their needs wherever they might trade.

The Westinghouse Brake & Signalling Co., Ltd., held its annual meeting on 27th March, Captain A. R. S. Nutting (chairman) presiding. In his statement issued with the report and accounts the chairman said that the associated companies in France, Italy and Germany continued to be prosperous but exchange rates minimized the value in sterling of the dividends received. Production at their factory at Chippenham reached the highest level in the history of the company, but the net results were disappointing. They continued to feel the effects of the increased costs of materials, equipment and services, and it took a considerable time to adjust prices to meet these increases. Many of their contracts extended over long periods and prices accepted as the basis for such contracts could not always be adjusted. The result was that the company's profit margin had fallen.

During the period to 1st October, 1949, they exported directly or indirectly 49 per cent of the total sales of all their products, omitting the rectifier side of their business. Including the rectifier side the export figure was 41 per cent of total sales. They were finding the export trade more and more difficult. The rectifier business remained steady and formed a marked proportion of their total production and sales. The opening of the new television transmitting station at Sutton Coldfield had resulted in a heavy demand for their rectifiers for television sets. In the near future a new and up-to-date plating plant shop would be available at their Chippenham factory.

Hilger & Watts, Ltd.—Presiding at the annual meeting held on 22nd March, Mr. G. A Whipple (chairman and managing director) said that the range and nature of their products were such that there were few branches of industry, education and research where they did not find increasing use. Over 60 per cent of their sales last year were exported. Plans were in hand for the erection of a new factory in the greater London area.

Aberdare Cables, Ltd., in a preliminary statement, shows a group profit, after all charges, including taxation, of £142,480, as compared with £65,339 for the previous year. The amount attributable to Aberdare shareholders was £134,853 (against £70,358). A second interim dividend of 7½ per cent has been declared, to be regarded as the final. This makes a total of 20 per cent for the year (against 15 per cent made up of 6 per cent interim on smaller capital and 9 per cent final). It is stated that when the first interim of 12½ per cent was paid in September last it was anticipated that the results would permit a final dividend at least equal. During the past few weeks the outlook has changed. In common with similar manufacturers, the bulk of the company's orders have been suspended by the British Electricity Authority, reducing the company's output considerably, and the directors cannot reliably forecast future operations. They have therefore decided to adopt a more prudent dividend policy.

The Telegraph Construction & Maintenance Co., Ltd., reports a group profit, after all charges, including tax, of £145,047 for 1949, as compared with £150,964 for 1948.

It is proposed to pay a final dividend of 4 per cent, less tax, making 9 per cent for the year. The final for 1948 was 5 per cent, making 10 per cent on £781,637 capital. A 25 per cent bonus was distributed in August last, raising the issued capital to £977,046. The amount involved in the above dividend is unchanged.

A. C. Cossor, Ltd., announce that their operations for the year ending 31st March will result in a profit and the financial position is substantially improved. The profit, however, will not be sufficient to cover the loss brought forward, and the directors therefore do not consider the time has yet arrived for a payment to be made on account of the arrears of dividend on the 6 per cent preference shares.

The Jerusalem Electric & Public Service Corporation, Ltd., reports a loss to 31st March, 1949, of £I 90,123, as compared with a profit of £I 62,848 for the preceding year. After transferring £I 50,000 from contingency reserves and adding £I 20,733 brought in, a debit of £I 19,390 is carried forward.

Joseph Lucas, Ltd., have declared an interim dividend of 4d per £1 ordinary share, less tax. This is equivalent to the interim dividend of 5 per cent paid last year before the 200 per cent bonus issue.

J. & F. Stone Lighting & Radio, Ltd., have declared an unchanged interim dividend of 10 per cent.

The Nigerian Electric Supply Corporation, Ltd., is again paying an interim dividend of 4 per cent.

NEW COMPANIES

Weston Hart, Ltd.—Registered 16th March. Capital £25,000. To acquire the business of wireless, television and electrical dealer and engineer now carried on by L. Leek at 84, London Road and 236/8, Fratton Road, Portsmouth; 235/7, Albert Road, Southsea; and 47, High Street, Cosham, as Weston Hart. Directors: L. Leek and Mrs. Vera I. Leek. Regd. office: 84, London Road, Portsmouth.

Electrolumination (Midlands), Ltd.—Registered 15th March. Capital £1,000. Directors: J. F. Aldridge, R. C. Spencer, L. W. Spencer and G. S. Gillies. Regd. office: 53, East Bond Street, Leicester.

Foster Magneto Co., Ltd.—Registered 25th February. Capital £2,000. Electrical and mechanical engineers, etc. Directors: A. R. J. Foster, Jane E. Foster, and E. O. Foster. Regd. office: 3 (A), Whitgift Street, Croydon.

John H. Scott Electric, Ltd.—Registered in Edinburgh, 23rd February. Capital £10,000. Merchants, dealers, general electrical, ventilating and lighting engineers, etc. Subscribers: J. H. Scott, 40, West Campbell Street, Glasgow, C.2, and W. H. McIntosh, 21, West Albert Road, Kirkcaldy.

J. Y. Brown, Ltd.—Registered 24th February. Capital £500. Domestic and electrical engineers and contractors, etc. Directors: J. Y. Brown and Mrs. Hilda Brown. Regd. office: Market Place, Hedon, E. Yorks.

Penge Electric, Ltd.—Registered 18th March. Capital £1,500. Manufacturers of and dealers in domestic, household and general electrical and other equipment, etc. Directors: S. G. Burdick and E. R. Mearns. Regd. office: 13a, High Street, Penge.

WINDING-UP ORDER

Electric Plant, Ltd.—In the Companies' Court on 20th March, Mr. Justice Wynn Parry had before him a petition for the compulsory winding-up of Electric Plant, Ltd. The petition was by creditors for over £8,000.

There was no opposition and an order was made for the compulsory winding-up of the company.

LIQUIDATIONS

Senior Lighting Co., Ltd.—In accordance with Section 293 of the Companies Act, 1948, a meeting of creditors was held recently in London when a statement of affairs was presented which showed liabilities amounting to £9,305. After allowing for preferential claims there were net assets of £641, leaving a deficiency as regarded the creditors of £8,664. The issued capital amounted to £750 and, so far as the shareholders were concerned there was a total deficiency of £9,414. A resolution was passed confirming the voluntary liquidation of the company with Mr. A. A. Henley, of 19-20, Grosvenor Place, London, S.W.1, as liquidator. A committee of inspection was also appointed.

BANKRUPTCIES

H. F. Mouncey, 4, Cromer Road, Tooting, London, S.W.17, electrical engineer.—First meeting 31st March at 3, Central Buildings, Matthew Parker Street, Westminster, S.W.1. Public examination 4th May at the County Court, Scarbrook Road, Croydon.

W. M. Horsfall, carrying on business at 7, Redcrop Street, Liverpool, electrical engineer.—Order of adjudication dated 24th November, 1923, annulled and receiving order dated 24th November, 1923, rescinded on 17th March, 1950, on the grounds that all fees, costs, charges and debts have been paid in full, together with 4 per cent statutory interest.

FINANCIAL SECTION

STOCKS and SHARES

APRIL 18th is now the "operative" date for Stock Exchange markets and prices. Until the introduction of the Budget on that day, it would be rather optimistic to look for any noticeable revival of public interest in Stock Exchange securities, more particularly as Easter intervenes. To-day's prices, as compared with those of a month ago, show less change than might have been expected. There are a good many alterations, the majority in the downward direction. British Electric Traction has shed 80 points. On the other hand, Cable & Wireless ordinary, Reyrolle, Telegraph Condenser, Automatic Telephone, C. A. Parsons and Ericssons are amongst those which show useful improvement. Switchgear & Cowans publish a good report and, as already announced, repeat the previous 20 per cent dividend. The 5s shares are quoted at 15s ex dividend.

English Electric Meeting

Sir George Nelson's speech at the English Electric meeting last week should clear up a number of misconceptions about the meaning of profits and dividends. In particular, he made the point that both must be measured not against issued capital, but against the capital employed in the business; and English Electric has over £6 million of reserves so employed, apart from the nominal amount of capital. To put the 10 per cent dividend further into perspective, he broke down the constituents of the annual turnover to show that dividends account for less than one per cent; and recalled that, for the shareholder who paid £1 for the shares in 1918, and bore the capital reduction in 1930, the present payment represents only 1.6 per cent on his investment. At their present price of 40s 6d the shares yield £4 18s 9d per cent.

Telegraph Construction

This company is scaling down the final dividend from 5 to 4 per cent in strict proportion to the 25 per cent increase in nominal capital resulting from the share bonus distributed last August. In terms of money, the payment is exactly as before. Total for the year is 9 (against 10) per cent, but since the 5 per cent interim was paid before the capital increase, the shares have properly to be assessed on an 8 per cent dividend basis. They came back $\frac{1}{16}$ to 36s 3d, on the announcement, and the yield is calculated as £4 8s 3d per cent. Profits represent gross earnings of about 27 per cent on the enlarged ordinary capital.

Johnson and Phillips

Like Telegraph Construction, Johnson & Phillips have distributed a one-in-four share bonus since they paid the interim dividend for 1949. For yield purposes, the market consequently makes a distinction between this and the majority of cases where the bonus results from a straight-forward capitalization of reserves (as in the T.C. & M. issue). J. & P. shares are currently valued accordingly on the basis of the full 15 per cent paid, on the smaller capital, for 1948. At 61s they yield £4 18s 4d per cent, at the 15 per cent rate.

Aberdare Cables Dividend

Although the final distribution of 7½ per cent on Aberdare Cables ordinary brings the year's total to 20 per cent—an increase of 5 per cent on the 1948 payment— it fell short of expectations built on the raising of the interim, last September, from 6 to 12½ per cent. On the strength of that, the quotation came up last year from under 50s, at one time, to a peak of 68s 3d. In the event, the final is now being reduced from 9 to 7½ per cent. The immediate reaction was a drop of 5s, to 60s, in the quotation. Profits exhibit an impressive advance in the preliminary statement which, however, qualifies satisfaction with a reference to recent suspension of orders from the B.E.A.

Anglo-American Telegraph

Quotations for this company's ordinary and deferred stocks were marked down on news of the House of Lord's adverse decision on the dispute with Western Union over the payment of profits tax on the revenue which A.A.T. receive, as rental for their lines, etc., to Western Union. Although the system on which profits are allocated between the three classes of capital does not permit exact calculations, the market expects now to see the ordinary stock payment reduced to around 2½ per cent, a fraction less than the full 6 per cent on the preferred ordinary, and nothing available for the deferred until the profits tax is reduced. The ordinary and deferred stocks have dropped respectively from 55 to 50, and from 15½ to 12½. The company proposes to present the accounts for three years, up to March, 1950, about June. In the hope that the preferred stock will receive nearly as much as 6 per cent, the price was advanced to 96½.

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Electrical Investments

Past Month's Price Changes

Company	Dividend Previous	Dividend Last	Middle Price 27 Mar. 1950	Month's Rise or Fall	Yield p.c.
Overseas Electricity Companies				£ s. d.	
Atlas Elec.... ...	2	2½	14/3	−3d.	3 10 2
Calcutta Elec. ...	6†	6†	22/-	—	5 9 1
Cawnpore Elec. ...	13	10	37/6	—	5 6 8
East African Power	7	7	35/3	+1/6	3 19 6
Jerusalem Elec. ...	5	6	13/3	--	—
Madras Elec. ...	8	5	30/-	—	3 6 8
Nigerian Elec. ...	10	10	30/-	−1/8	6 13 4
Palestine Elec. "A"	5	Nil	21/- × rts.	—	—
Perak Hydro-Elec.	Nil	Nil	8/6	−6d.	—
Whitehall Inv. Pref.	—	6	23,6	—	5 4 4
Equipment and Manufacturing					
Aberdare Cables ...	15	20	60/-	—	5 0 0
Aron Elec. Ord. ...	15	15	28/9	−1/8	10 8 8
Assoc. Elec. Ord. ...	15	15	71/3	+1/8	4 4 2
Automatic Tel. & El.	12½	12½	55/-	+3/3	4 11 0
Babcock & Wilcox	15	15	58/3	+9d.	5 2 9
Baldwin, H. J. (2/-)	25	25	4/9	—	10 10 6
British Aluminium	10	10	40/9	+3d.	4 18 0
B.I. Callender's ...	6¾	6¾	31/6	—	4 5 2
British Thermostat (5/-)	23½	25	24/6	+9d-	5 2 1
British Vac. Cleaner (5/-)	20	20	9/6	+6d.	10 10 6
Brush Ord. (5/-) ...	10	10	6/6	+9d.	7 13 10
Burco (5/-)... ...	35	35	20/-	—	8 15 0
Chloride El. Storage	20	20	45/9	+ 1/8	4 7 4‡
Cole, E. K. (5/-) ...	22½	20	16/3	−6d.	6 3 1
Cossor, A. C. (5/-)...	Nil	Nil	7/9	− 1/8	—
Crabtree (10/-) ...	17½	17½	33/6	−1/-	5 4 6
Crompton Parkinson Ord. (5/-) ...	22½	22½	11/-	—	5 2 0‡
De La Rue (5/-) ...	50	50	21/3	− 1/8	11 15 4
Decca (1/-)... ...	112½	112½	11/9	−6d.	9 8 0
E.M.I. (10/-) ...	8	8	19,9	− 1/8	4 0 2
Electrical Components (5/-) ...	20	20	10/9	−6d.	9 6 0
Elec. Construction	12½	12½	45/9	—	5 9 8
Enfield Cable Ord.	7½	7½	31/3	+ 1/8	4 16 0
English Electric ...	10	10	40/6	—	4 18 9
Ericsson Tel. (5/-)...	20†	20†	42/6	+1/8	2 7 0
Ever Ready (5/-) ...	40	40	31/3	+1/6	6 8 0
Falk Stadelmann ...	15	15	36/3	—	8 5 6
G.E.C. Ord. ...	17½	17½	75/-	—	4 13 4
General Cables (5/-)	50	50	16/3	− 1/8	9 4 8‡
Greenwood & Batley	15	15	38/3	—	7 16 10
Hackbridge Cable (5/-)	—	20	11/6	−6d.	8 13 10
Hackbridge Hewittic (5/-)	12	12½	12/6	+6d.	5 0 0
Hall Tel. Acc. (10/-)	10	10	13/6	+6d.	7 8 2
Heatrae (2/-) ...	12½	12½	4/-	—	6 5 0
Henleys (5/-) ...	20	20	22/6	—	4 9 0
Hoover (5/-) ...	40	45	36/-	−1/-	6 5 0
Intl. Combustion (5/-)	37½	37½	15/-	− 1/8	5 0 0‡
Johnson & Phillips	15	15	60/9	+9d.	4 18 8

Company	Dividend Previous	Dividend Last	Middle Price 27 Mar. 1950	Month's Rise or Fall	Yield p.c.
Equipment and Manufacturing (continued)				£ s. d	
Lancashire Dynamo	22½	22½	92/6	—	4 17 0
Laurence, Scott (5/-)	12½	12½	13/3	—	4 15 3
London Elec. Wire	10	10	45/-	+1/6	4 9 0
J. Lucas	17½	17½	27/6	+6d.	4 5 0‡
Mather & Platt ...	11	11	47/9	+1/-	4 11 8
Metal Industries ...	10	10	41/3	−9d.	4 17 0
Mid. Elec. Mfg. ...	35	12½	53/9	—	4 13 0
Murex	20	20	44/6	—	4 10 0‡
Newman Ind. (2/-)	22½	17½	3/6	—	—
Oldham & Son (1/-)	60	60	5/6	—	5 10 0‡
Plessey (5/-) ...	20	20	15/-	—	6 13 4
Parsons C. A. ...	12½	12½	60/-	−1/8	4 3 4
Pye Deferred (5/-)...	25	25	31/3	—	4 0 0
Radio & Tel. (2/-)	Nil	25	9d.	—	—
Revo (10/-) ...	27½	27½	40/-	−1/6	6 17 6
Reyrolle	12½	12½	63/9	+ 1/8	3 18 6
Scophony Baird (1/-)	—	—	2/6	−1/-	—
Scot. Cable (4/-) ...	30	30	22/-	—	5 9 0
Siemens Ord. ...	7½	7½	31/3	—	4 16 0
Switchgear & Cowans (5/-)	20	20	15/-	—	6 13 4
T.C.C. (10/-) ...	15	15	33/9	−½	4 8 9
T.C. & M.	10	9	36/3	−⅛	4 8 3‡
Telephone Mfg. (5/-)	9	9	9/3	+3d.	4 17 3
Thorn Elec. (5/-) ...	25	20	16/3	−1/8	6 3 1
Tube Investments	25	25	5⅝	−1/8	4 9 0
Vactric (5/-) ...	Nil	Nil	8/9	−⅛	—
Veritys (5/-) ...	5	5	3/6	—	7 2 10
Walsall Conduits (4/-)	70	70	53/9	—	5 4 1
Ward & Goldstone (5/-)	50	50	35/-	−⅛	5 14 3‡
Watford (2/-) ...	20	20	6/3	+3d.	6 8 0
Westinghouse Brake	14	14	55/- × d.	−3/6	5 1 10‡
West, Allen (5/-) ...	10	10	6/9	—	4 12 7‡
Transport and Communications					
Anglo-Am. Tel: Pref.	6	2 5/6*	96½	+1½	—
Def.	—	—	12½	−3	—
Anglo-Portuguese...	8	8	25/6	+1/6	6 5 6
Brit. Elec. Traction: Def. Ord. ...	50	50	420	−80	3 18 6‡
Calcutta Trams ...	Nil	6†	22/6	−2/-	5 6 8*
Cape Elec. Trams...	6	6	18/6	+6d.	—
Cable & Wireless: 5½ Pref.	5½	5½	10/- × d.	—	5 9 0
Ord.	4	4	280½	+6½	—
Globe Tel. & Tel. Ord.	5†	5†	43/-	—	2 6 6
Great Northern Tel. (£10)	12	7	15	−1	4 13 4
Inter. Tel. & Tel. ...	Nil	Nil	24	−1	—
Marconi Marine ...	7½	7½	24/9	−1/6	6 1 2
Oriental Tel. Ord....	10	16	47/6	—	6 15 0
Telephone Props ...	6	6	18/9	+3d.	6 8 0
Tele. Rentals (5/-)...	10	10	10/6	+6d.	4 15 3

*Dividend postponed.

†Dividends are paid free of Income Tax.

‡ Yield adjusted to capital bonus issue.

WORK OF ONTARIO COMMISSION

Prosperity Brings its Problems

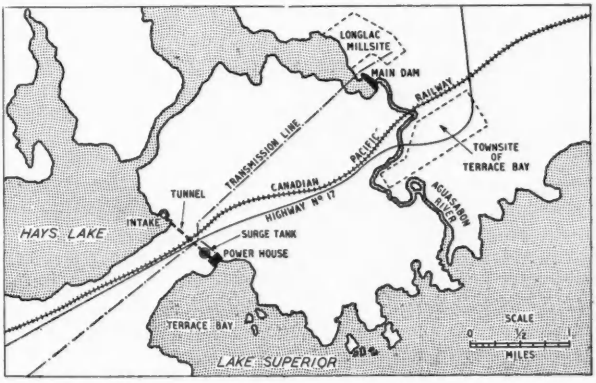
THE period covered by the latest report of the Hydro-Electric Commission of Ontario—the year ended 31st October, 1948—was one of increasing prosperity in the Province, states the chairman, Mr. R. H. Saunders. New factories and homes, the influx of new citizens and expanded electrical service in rural areas all combined to create an unprecedented demand on the Commission. Unfortunately, the year was marked by unusually dry weather and in spite of the 132,700 h.p. of additional plant capacity available (including purchased power), making the total 2,880,800 h.p., the output of 13,554 million kWh was 0.7 per cent less than in 1947. Restrictions became essential and a quota system was introduced.

Such good progress has been made with the vast post-war construction programme, however, that supplies should overtake demands by 1951. Capital expenditure in 1948 ($90.2 million) was greater than in any previous year and twice as much as in 1947. To that date 248,700 h.p. of generating plant had been completed since 1945 and 1,116,500 h.p. was under construction. In 1948 two developments reached the operating stage, at Stewartville, on the Madawaska River, and Aguasabon, in the Thunder Bay area. Plans were also in hand for starting the important work of frequency standardization.

To cope with the extended activities of the Commission the staff was increased by 5,000 during the year and the monthly payroll rose by $1,121,000 to $3,460,000. Included in the total of over 18,000 employees were 11,600 temporary workers who were engaged mainly on the hydraulic projects and associated works. Incidentally, the Commission is probably one of the largest caterers in the Dominion, more than 5½ million meals being served at the various construction camps during the year.

The rising scale of the Commission's activities has posed administrative problems. It was therefore decided in 1947 to divide the Province into nine regions and Mr. R. L. Hearn, the general manager and chief engineer, observes that from experience of the first few months' operation the decentralized administration has proved beneficial.

In the development field particular attention was directed to rural service and the number of new customers of this class (26,000) was larger than in any previous year, as also was the total of 3,556 miles of primary line constructed. Despite the restrictions in force the aggregate rural peak load rose by nearly 20 per cent. In the first three years of the five-year post-war plan 63,529 new rural consumers were actually served compared with the estimate of 38,746. Since 1938 the average annual consumption for farm service has risen from 1,692 to 2,916 kWh



General arrangement of Aguasabon development in N. Ontario

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while the cost per kWh to the farmers has decreased from 2.52 to 1.63 cents. For other rural consumers the corresponding figures were 960 to 2,304 kWh and 3.02 to 1.77 cents.

The Provincial Government makes a 50 per cent grant towards the capital cost of rural extensions and also assists by way of guarantee. A uniform rate structure is in force consisting of an initial block of kWh at 3.5 cents per kWh, a second block at 1.6 cents and further consumption at 0.75 cents.

An important section of the Commission's work is concerned with research and approvals testing. Mention may be made of an investigation into the use of heat pumps, equipment being ordered for an experimental installation at a transformer station with cooling water as the heat source. Of interest in the construction field was the use of modified Bailey bridging for the form work of concrete dams. In the preservation of wood poles encouraging results were obtained with toxic water solutions of pentachlorophenates.

Summarized operating results record a total revenue of $65.5 million, there being a balance of $2.7 million on the Southern Ontario—Thunder Bay Systems and a loss of $0.5 million on the Northern Ontario Properties. The general level of rates of charge remained unchanged, but the sharp rise in costs indicated the need for these to be reviewed.

IRISH PEAT FUEL

Its Use for Power Generation

IN view of the rising costs of coal production and improvements in methods of harvesting peat, increasing attention has been paid in recent years in many countries to the production of peat on a large scale for power generation. To obtain a commercial fuel from peat it is necessary to reduce the moisture content to between 10 and 55 per cent, depending on the proposed method of utilization.

An account of the physical and chemical characteristics of Irish peat, with special reference to moisture, was given by Mr. J. Martin, of the Irish Turf Development Board, in a paper entitled "Some Considerations on the Winning and Utilization of Peat," read to members of the Scottish branch of the Institute of Fuel in Glasgow.

Moisture in peat in its natural state is usually between 92 and 95 per cent, which may be reduced to about 90 per cent by drainage of the bog. Percentage in air-dried peat depends principally on the method of harvesting. In Ireland sod peat is air-dried to 30-45 per cent in hand-won fuel, 25-40 per cent in machine-won fuel, and 45-60 per cent in milled peat. The calorific value of peat is usually of the order of 9,500 to 11,000 B.T.U./lb. For Irish peat, the average net calorific value at 30 per cent moisture can be taken to be 6,000 B.T.U./lb.

In Russia, peat is used in power stations in areas where there is no indigenous coal or oil. In Sweden, Denmark and other countries it was of the greatest importance during the recent war, but since 1948 production has been considerably reduced because of the availability of alternative fuels from abroad.

The first power station in Ireland to use peat fuel was put into commission in January at Portarlington, Co. Leix. It has a total generating capacity of 25,000 kW and is supplied from a bog with an annual output of 120,000 tons of machine-won sod peat. At Allenwood, Co. Kildare, a second station has reached an advanced stage of construction and will have a capacity of 40,000 kW. It will be supplied from a bog with a potential annual output of 180,000 tons. A third station at Ferbane, Co. Offaly, of a capacity of 60,000 kW, is projected.

Milled peat is the cheapest form in which to produce the fuel for power generation. For this purpose the peat is air-dried on the bog in a disintegrated state varying in size from a finely divided powder up to pieces about ¾in cube. Improved rate of drying increases the number of harvests which can be won in a season. Milled peat can be handled easily by machine and is, therefore, the only process fully mechanized. In Ireland it is artificially dried by the "Peco" process to produce briquettes of 10 per cent moisture content.

On the question of cost, Mr. Martin stated that milled peat (poor conditions) worked out at 25.6d per million B.Th.U., milled peat (good conditions) 19.8d, and machine-won sod peat 34.5d, in contrast with 25.6d for coal and 56d for oil fuel, assuming approximate costs of 52s 6d a ton for coal delivered to power station and 188s a ton for fuel oil.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1944

8672. General Electric Co., Ltd., and Jakeman, R. G.—Ship propulsion systems embodying electrical or electromechanical power transmission means. 7th June, 1945. (637221.)

14885-6. Hope, V.—Electric fuses. 4th September, 1945. (637431-2.)

19648. Arnold, O. M.—Treatment of fusible and reactive materials in high-frequency electric fields. 12th October, 1944. (637433.)

1945

3668. British Thomson-Houston Co., Ltd.—Electron microscope. 14th February, 1945. (637361.)

29588. Soc. Anon. de Télécommunications.—Vacuum tube oscillation generators. 6th November, 1945. (637292.)

33770. Vandervell Products, Ltd., Green, D. F., Mallet, N. P., and Briscoe, J. M.—Electrodeposition of metals. 5th December, 1948. (Cognate applications 4333, 12th February, 1946, and 13017, 30th April, 1946.) (637159.)

1946

2878. British Thomson-Houston Co., Ltd. (General Electric Co.).—Combustion units particularly for use in gas turbine systems. 29th January, 1946. (637223.)

3510. Centre National de la Recherche Scientifique.—Electrostatic influence machines. 4th February, 1946. (Cognate application 3511, 14th August, 1945.) (637434.)

4763. British Thomson-Houston Co., Ltd.—Rotary driving apparatus suitable for the drive of magnetic cyclometer registers. 15th February, 1946. (637224.)

9136. Hydran Products, Ltd., and Motley, L.—Lighting of roads. 25th March, 1947. (637160.)

11670. Standard Telephones & Cables, Ltd., and Robertson, J. S. P.—Electro-magnetic vibratory devices. 3rd April, 1947. (637161.)

15502. Soc. Francaise Radio-Electrique.—Circuits for supplying the deflecting systems of cathode-ray oscillographs. 22nd May, 1946. (637296.)

17854. Electro Metallurgical Co.—Alloys for use at high temperatures. 14th June, 1946. (Addition to 600068.) (637436.)

18714. British Thomson-Houston Co., Ltd.—Combustion chambers for liquid fuels. 21st June, 1946. (637229.)

19102. Sperry Products, Inc.—Means for synchronizing an electronic wave generator and power supply. 26th June, 1946. (637164.)

22354. Gfeller Akt.-Ges., C.—Telephone installations in which a number of junction lines are available to a greater number of subscribers for calls to an exchange. 26th July, 1946. (Cognate application 22355, 4th September, 1945.) (637297.)

25216. Brady, J. B.—Television transmission systems. 23rd August, 1946. (637230.)

28295. Compagnie Générale d'Electricité—Method of making electrolytic condensers. 20th September, 1946. (637369.)

28819. Compagnie Générale d'Electricité.—Covering of woven filaments for the electrodes of electric accumulators. 26th September, 1946. (637167.)

30664. Igranic Electric Co., Ltd.—Refrigerator control systems. 15th October, 1946. (637299.)

31350. Liquidometer Corporation.—Electrical control devices for tanks. 22nd October, 1946. (637370.)

34925. Philips Lamps, Ltd.—Aerial-coupling circuits. 25th November, 1946. (637171.)

36575. M-O Valve Co., Ltd., and Clack, B. N.—Gas and/or vapour-containing discharge devices. 30th September, 1947. (637441.)

37258. Philips Lamps, Ltd.—Ultra-high-frequency amplifying circuits. 18th December, 1946. (637375.)

38045. Philips Lamps, Ltd.—Electric resistance boxes. 30th December, 1946. (637442.)

1947

90. Hasler Akt.-Ges. Werke für Telephonie und Prazisionsmechanik.—Electromechanical band filters. 1st January, 1947. (637377.)

1628. Standard Telephones & Cables, Ltd.—Electron-discharge devices. 17th January, 1947. (637379.)

3515. Smith, J. B.—Circuits for controlling the frequency of generated oscillations. 4th February, 1948. (637380.)

5472. British Thomson-Houston Co., Ltd.—Electric discharge devices. 25th February, 1947. (637382.)

5724. Stivin, J.—Device for controlling an adjustable quantity of electric energy. 27th February, 1947. (637240.)

5890. Soc. Independante de Télégraphie sans Fil.—Multiple frequency oscillators. 28th February, 1947. (637179.)

6505. Ravera, M.—Apparatus for the automatic calling of pre-selected and pre-set telephone numbers. 7th March, 1947. (Convention date not granted.) (637383.)

8107. Oxford, A. J. H., Yates Fish, N. L., and Forshaw, H. W.—Thermionic valve-circuits. 2nd March 1948. (637183.)

10283. Bendix Aviation Corporation.—Frequency and phase control system. 17th April, 1947. (637243.)

11592. Philips Lamps, Ltd.—Process of manufacturing cathodes for electric-discharge tubes. 30th April, 1947. (637385.)

12476. Sletner, P. G.—Electrical heating elements. 8th May, 1947. (637452.)

15219. Compagnie Générale de Télégraphie sans Fil.—Magnetrons. 10th June, 1947. (637455.)

15303. Soc. per Azioni Vetrocoke.—Photo-electric device for recording differential pressures. 10th June, 1947. (637456.)

15668. British Thomson-Houston Co., Ltd.—Electric flatirons. 13th June, 1947. (637457.)

15815. British Thomson-Houston Co., Ltd.—Thermostatically controlled electric flatirons. 16th June, 1947. (637458.)

15836. Asher, H. M. F.—Time base circuits for cathode-ray tubes. 16th June. 1947. (637314.)

15991. Aron Electricity Meter, Ltd., and Riordan, E. J.—Electricity meters, time switches or relays. 10th June, 1948. (637459.)

16111. Muirhead & Co., Ltd., and Bell, J.—Variometers and induction regulators. 21st May, 1948. (637316.)

16232. Edison Swan Electric Co., Ltd., and Winfield, J.—Electrolytic apparatus. 15th April, 1948. (637317.)

16233. Edison Swan Electric Co., Ltd., and Winfield, J.—Method of extracting metals, more particularly lead, from drosses, slags or other metal-bearing materials 15th April, 1948. (637318.)

16922. Holmqvist, N. E. F.—Tools for mounting electrical switch devices such as contact spring assemblies or the like. 26th June, 1947. (637193.)

18831. Sperry Gyroscope Co., Inc.—Electron-discharge tubes. 15th July, 1947. (637463.)

19346. Forman, J.—Electrical circuit protection systems for power distribution and like networks. 19th July, 1948. (637392.)

19347. Forman, J.—Electrical circuit breakers and electrical circuit protection systems. 19th July, 1948. (637393.)

19785. Metropolitan-Vickers Electrical Co., Ltd., and Simpson, W.—Co-polymerization of substances containing allyl compounds. 2nd March, 1948. (637464.)

21692. Sylvania Electric Products, Inc.—Starting

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relay for electric gaseous discharge lamps. 7th August, 1947. (637324.)

21707. Blick Time Recorders, Ltd., and Elliott, W. A.—Time-recording apparatus. 9th August, 1948. (Cognate application 15029, 3rd June, 1948.) (637396.)

24240. British Mechanical Productions, Ltd., and Shorey, L. W.—Socket members for electrical pin plug-and-socket connections. 1st September, 1948. (637201.)

25817. Standard Telephones & Cables, Ltd., and Hargreaves, T. F. S.—Carrier telegraph systems. 17th September, 1948. (637473.)

27909. Kulka, V. (Weiss, F.).—Electric circuit-breakers for alternating-currents. 18th October, 1947. (637407.)

28049. Baker, P. W.—Electric lighting appliances. 5th March, 1948. (637408.)

28182. Cinema-Television, Ltd., and Logan, S. Y.—Apparatus for detecting and/or locating by electrical means masses of electrically conducting or magnetic material. 20th September, 1948. (637336.)

31219. Cinema-Television, Ltd., and Hill, F. L.—Thermionic valve amplifiers and oscillators. 21st October, 1948. (637341.)

31320. Hobbs Transmission, Ltd., Hobbs, H. F., and Thompson, J. A.—Friction clutches. 15th September, 1948. (637269.)

31961/2. Landis & Gyr Soc. Anon.—Electric receiving or switching devices for remote control installations. 3rd December, 1947. (637415/6.)

32092. Cinema-Television, Ltd., and Sowerby, J. M.—Electronic switching circuits. 18th November, 1948. (637343.)

32519. Trist & Co., Ltd., R., and Chambers, W. A.—Alarm or indicating systems employing photo-electric cells. 26th November, 1948. (637207.)

32631. Hansen, A.—Pliers for cutting open the metallic sheath of electric cables. 11th December, 1947. (637484.)

35198. Philips Electrical, Ltd.—Electrical transformers and inductances. 31st December, 1947. (637210.)

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382. Wigan, E. R.—Electric measuring circuits. 7th February, 1949. (637487.)

536. Victor Products (Wallsend), Ltd., and Hyslop, E.—Press-button and other like hand-operated electric switches. 30th December, 1948. (637489.)

3041. Werkspoor, N. V.—Universal joints for a locomotive driven by an electromotor. 2nd February, 1948. (637276.)

4767. Metropolitan-Vickers Electrical Co., Ltd.—Variable reactances. 18th February, 1948. (637277.)

6124. Metropolitan-Vickers Electrical Co., Ltd., Drake, W. E. J., Wotton, E. G., and Holloway, D. H.—Electric light fittings. 23rd February, 1949. (637213.)

6786. British Thomson-Houston Co., Ltd.—Moulded tubular bodies. 4th March, 1948. (637494.)

7685. Ferranti, Ltd., Chilcot, A. L., Whitmore, E. J., and Bigg, W. S.—Manufacture of vacuum capacitors. 10th March, 1949. (637280.)

10396. Bullers, Ltd., Langton, J. L., and Robinson, W. G.—Electric insulators. 25th March, 1949. (637218.)

14499. British Thomson-Houston Co., Ltd.—Ignition means for combustion chambers. 28th May, 1948. (637286.)

14673. British Thermostat Co., Ltd., and Sherlock, J. E.—Snap-action electric switch devices. 27th May, 1949. (637496.)

14686. British Telecommunications Research, Ltd., Walmsley, T., and Leigh, R. C.—Signal transmission systems. 31st May, 1949. (637289.)

16756. General Electric Co., Ltd., Gossling, B. S., Souter, L. S., and Phillips, H. M.—Manufacture of resistors comprising a liquid high-resistance medium. 10th August, 1949. (637497.)

NEXT WEEK'S EVENTS

Monday, 3rd April

BIRMINGHAM.—James Watt Memorial Institute, 6 p.m. I.E.E. South Midland Centre. "Standardization in the Electrical Industry," by J. T. Moore.

LIVERPOOL.—At the Royal Institution, Colquitt Street, 6.30 p.m. I.E.E Mersey & North Wales Centre. Annual general meeting. Lecture on "KVA in U.S.A.," by G. E. Peirson.

LONDON.—Savoy Place, W.C.2, 6 p.m. I.E.E. Education Discussion Circle. Discussion on "The Place of the Model in Teaching," opened by D. G. Sandeman.

NEWCASTLE.—King's College, 6.15 p.m. I.E.E. North-Eastern Radio & Measurements Group. Annual general meeting. "Radar Automatic Tracking," by F. J. V. Ritson.

ROMFORD.—Mawney's Arms, Mawneys Road, 8 p.m. A.S.E.E. North East London Branch. "Electric Welding," by H. E. J. Butler.

SHEFFIELD.—Royal Victoria Station Hotel, 7.30 p.m. A.S.E.E. Sheffield Branch. "Some Notes on Belt Conveyor Systems on Heavy Industrial Plant," by A. R. Creswick.

Tuesday, 4th April

HAMMERSMITH.—Town Hall, 7.30 p.m. A.S.E.E. West London Branch "How London's Tube Railways are Built."

LEEDS.—E.L.M.A. Lighting Service Bureau, 24, Aire Street, 6.30 p.m. I.E.E. North Midland Students' Section. "Protection of Power Station Equipment," by R. W. Craven and G. Gascoigne.

LIVERPOOL.—Electricity Board's Showroom, Whitechapel, 6 p.m. I.E.S. Liverpool Centre. "Light and Crime," by Det. Ch. Inspector C. Campbell.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Measurements Section. "Dielictric Admittances in Transformers," by A. H. M. Arnold.

MANCHESTER.—Engineers' Club, Albert Square, 6.15 p.m. I.E.E. North-Western Centre. "The M.K.S. or Giorgi System of Units: the Case for its adoption," by L. H. A. Carr. "Rationalized M.K.S. Units in Electrical Engineering Education," by Dr. E. Bradshaw.

SOUTH HARROW.—St. Hilda's Hall, Northolt Road, 7.45 p.m. A.S.E.E. North West London Branch. "Application of Induction Motors," by F. T. Bartho.

Wednesday, 5th April

NEWCASTLE-ON-TYNE.—Minor Durant Hall, Oxford Street, 6.15 p.m. I.E.S. Newcastle Centre. Annual general meeting.

PORTSMOUTH.—British Electricity House, 111, High Street, 6.30 p.m. I.E.E. Southern Centre. "Fault-Throwing Tests on the 132 kV Grid System under Normal Working Conditions," by W. Casson and F. H. Birch.

Thursday, 6th April

GLASGOW.—At the Institution of Engineers & Shipbuilders, 6.45 p.m. British Institution of Radio Engineers, Scottish Section. "Electrical Measurements," by Dr. F. M. Bruce. (Joint meeting with the Institute of Physics.)

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section, the date of the issue is given in parentheses.

Australia.—BRISBANE.—12th April. Queensland State Electricity Commission. Armoured cable and cable end sealing boxes. (C.R.E. (I.B.) 47207/50. Ten/1107.)*

Bedfordshire.—County Council. Electrical installations in new county primary schools at Dunstable and Kempston. (See 24th March issue.)

Belfast.—28th April. Electricity Department. Supply of 6,600 V and 400 V auxiliary switchgear and accessories. (See 24th March issue.)

Blaydon.—7th April. U.D.C. Supply of electrical fittings to building sites on the Neighbourhood Unit, Lichfield Lane, Winlaton. Housing surveyor, Council Offices.

Consett.—22nd April. U.D.C. Electric street lighting installation. (See this issue.)

Denbighshire.—Education Authority. Heating and electrical installation at proposed new Welsh primary school at Wrexham. (See this issue.)

Edinburgh.—1st May. North of Scotland Hydro-Electric Board. 11 kV and lower voltage distribution lines. (See this issue.)

Glasgow.—10th April. Corporation. Supply of electric cable, etc., for one year from 1st June next. Office of Public Works, Room 81, City Chambers.

India.—BANGALORE.—14th April. Government of Mysore Stores Purchase Committee. Underground cables and accessories. (C.R.E. (I.B.) 6915/50. Ten/1106.)*

Lockerbie.—20th April. Town Council. Street lighting equipment. (See 24th March issue.)

Oldbury.—15th April. Corporation. Electric discharge lighting equipment. (See 24th March issue.)

Pakistan.—25th April. High Commissioner. Supply of 200 tons of steel conductor and telegraph wire. (See 24th March issue.)

Stockport.—14th April. Corporation. Street lighting equipment. (See 24th March issue).

ORDERS PLACED

Bradford.—Housing Sub-Committee. Installation of electricity in twelve houses at Ecclesbill (South) estate (£268).—T. D. Long.

London.—ISLINGTON.—Law and General Purposes Committee. Installation of stage lighting apparatus at public hall (£1,789).—London Electricity Board. Seven other tenders were received ranging from £1,794 to £3,150.

Washington (Durham).—U.D.C. Electrical installations in 44 new houses.—Devereux Moodie & Co., Ltd., Newcastle-on-Tyne.

CONTRACTS IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Ayr.—Works extensions; Scottish Agricultural Industries, Ltd., 199, High Street.

Basingstoke.—Works extensions; Kelvin, Bottomley & Baird, Ltd., Winchester Road.

Belfast.—Dwellings (196) Dundonald; Northern Ireland Housing Trust, 12, Donegall Square West.

Birkenhead.—Extensions at St. Anselm's College; E. Kirby & Sons, architects, 5, Cook Street, Liverpool.

Alterations at Kirklands secondary school (£30,899); H. Roberts (Builders & Contractors), Ltd., Birkenhead.

Shops (£43,903); Edward Thomas (Construction), Ltd., Birkenhead.

Birmingham.—Extensions and adaptations at Hill Top Hospital for Regional Hospital Board; J. & A. Brazier, Ltd., Worcester Road, Bromsgrove.

Boldon.—Houses (72), West Boldon; N. Hindmarsh, surveyor.

Bollington (Cheshire).—Houses (12), Grimshaw Road site; U.D.C. surveyor.

Brandon.—Houses (160); F. Hedley, U.D.C. architect.

Builth Wells.—Additions and alterations to County Grammar School; county architect, Rhyd Offices, Brecon.

Chesterfield.—Classroom block (£20,000) at Mary Swanwick School; Wilcockson & Cutts, architects, 12, Saltergate.

Clacton-on-Sea.—Extensions to St. Osyth's Teachers' Training College; A. R. Dannatt & Son, architects, Prudential Buildings, Duke Street, Chelmsford.

Consett.—Houses (60), Cutlers Hall estate, Ferryhill, for the U.D.C.; E. Jeffcock, Ltd., builders, New Bridge Street, Newcastle-on-Tyne.

Coventry.—Counden Court primary school; W. S. Hattrell & Partners, architects, 1, Queens Road.

Leeds.—Divisional police station at Ireland Wood (£12,281), Cookbridge estate; W. J. Simms, Sons & Cooke, Ltd., Neville Road, Halton Moor, Leeds.

*Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Thames House North, Millbank, S.W.1 (Victoria 9040).

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Litherland.—Flats (96) Linacre Road; U.D.C. surveyor.

Liverpool.—Extensions to College of Commerce, Tithebarn Street (£58,490); Wm. Hall & Son, Ltd., Liverpool.

Extensions to Old Swan Institute (£87,000); R. Wearing & Sons, Ltd., Liverpool.

Erection of Christ the King R.C. primary school; John Williams (Liverpool), Ltd., 70 Collingwood Street.

London.—BATTERSEA.—New wing to Battersea Polytechnic, Battersea Park Road; Campbell Jones & Sons, architects, 9, Dowgate Hill, E.C.4.

UPPER THAMES STREET.—Public cleansing depot and wharf for City of London Corporation; city engineer.

HAMPSTEAD.—Block of 63 flats, laundry, etc., Adelaide Road, for L.C.C.; Louis de Soissons, architect, 3, Park Square Mews, N.W.1.

HOLBORN.—Office block, Ely Place; Brixton Estate, Ltd., 61, Bartholomew Place, E.C.1.

SOUTHWARK.—146 flats and 13 shops, East Street; borough engineer.

Lossiemouth.—Houses (90) at Royal Naval Air Station; John Bisset & Sons, Ltd., builders, Back Hilton Road, Aberdeen.

Luton.—Showrooms, George Street & Wellington Street; Saxone Shoe Co., Ltd., 89, Titchfield Street, Kilmarnock.

Middlesbrough.—Houses (72) at Beechwood for the T.C.; builders, J. H. Crawford (20 houses), Buxton and Co. (24) and Hudson Brothers (28). All local builders.

Houses (92), Holmwood site; borough engineer.

Mossley.—Houses (40), Micklehurst; Howard & Benson, architects, 88, Mosley Street, Manchester.

Newcastle-on-Tyne.—New municipal buildings (to be erected in sections) for the City Council; city architect, 18, Cloth Market, Newcastle.

Newport (Isle of Wight).—Power house and stores; Gould, Hibberd & Randall, Ltd., Church Litten.

Newton Aycliffe.—Houses (83), Clarence Farm East, for the Aycliffe Development Corporation; Grenfell-Baines Group, architects, Simpasture, Newton Aycliffe.

Northampton.—Houses for R.D.C.; Holloway & Sons, Ltd., Clarence Avenue, Northampton (46); Acme Building Co., Ltd., Northampton (16); Underwood & Weston, Lady's Lane, Northampton (4); Howard & Mason, Yardley Rd., Olney, Bucks (6).

North Riding.—Conversion of Welburn Hall and Brompton Hall into residential schools for the C.C. (£24,465); county architect, County Hall, Northallerton.

Secondary modern school at Whitby and county primary schools at Guisborough and Northallerton for the C.C.; county architect, County Hall, Northallerton.

Northumberland.—Police houses (43) on 13 sites for the C.C.; county architect, County Hall, Newcastle-on-Tyne.

Penrith.—Factory additions for S. Redmayne and Sons, Ltd., clothiers.

Sheffield.—Out-patients' department at Jessop Hospital for Regional Hospital Board; J. Mansell Jenkinson & Son, architects, 18, Norfolk Row.

Southampton.—New county offices, for Hand C.C.; C. Cowles-Voysey, architect, 2, Bunke Hill, London, N.W.11.

Surbiton.—Factory, Cox Lane; Barnes Bro (Welders), Ltd., 320, Ewell Road.

West Bromwich.—Factory extensions f Charles (Wednesbury), Ltd., Holloway Ban West Bromwich; W. Kendrick & Son, Ltd Tasker Street, Walsall.

Whyteleafe.—Factory, Godstone Road; E. H Firmin, 10, Manchester Square, W.1.

Wrexham.—Large mill; British Celanese, Ltd Hanover Square, London, W.1.

Wyke Regis.—Primary infants' school f Dorset E.C.; E. W. Lewis, architect, 70, S Thomas Street, Weymouth.

York.—Extensions to works, for Rowntree Co., Ltd.; S. Carr, staff architect, Cocoa Work

TRADE MARKS

APPLICATIONS have been made for th registration of the following trade mark Objections may be entered within a month o 22nd March.

VERTAXCEL. No. 680,325. Class 7. Pump included in Class 7 combined with electri motors.—Rhodes, Brydon & Youatt, Ltd Waterloo Engineering Works, Gorsey Moun Street, Stockport.

No. B648,412 (design). Class 9. Electrically operated valves incorporating thermostati controls; thermostats; controlling appliance consisting of electric switches operated b pressure-responsive or temperature-responsiv actuators for use in furnaces, industrial ovens heating and air-conditioning installations, in stallations for creating artificial draught an in refrigerating installations; and electric tim switches for use with mechanical stokers.— White-Rodgers Electric Co., St. Louis Missouri, U.S.A. Address for service, c/o Frank B. Dehn & Co., Kingsway House, 103 Kingsway, London, W.C.2.

TEKTOR. No. 675,083. Class 9. Electroni apparatus for performing switching operation by means of its sensitivity to the proximity of moving objects; and counting, measuring indicating, signalling and checking apparatu incorporating such electronic switching apparatus.—Fielden (Electronics), Ltd., Hol Town Works, Manchester, 10.

ELEPHANT. No. 685,365. Class 9. Thermo stats.—Evans Electronic Developments, Ltd., 2a, Birchfield Road, Six Ways, Birmingham, 19.

JOHN CROAL ELECTRICAL CONTRACTOR, EDIN BURGH (design). No. 677,174. Class 11. Electrical installations for lighting, heating, cooking, refrigerating, and ventilating.—John Croal, 54, Broughton Street, Edinburgh.

MARCOLUXE. No. 685,761. Class 11. Refrigerators, refrigerating apparatus and refrigerating installations, and parts of and fittings for all such goods, all included in Class 11.—Marco Refrigerators, Ltd., Manor Works, Rowan Road, Streatham Vale, London, S.W.16.

TOMLINSON. No. B679,788. Class 12. Electrically driven trucks.—Tomlinson (Electric Vehicles), Ltd., 16, Brownlow Mews, London, W.C.1.